

Differing Influence on Delays in the Case-Finding Process for Tuberculosis Between General Physicians and Specialists in Mongolia

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The objective of this study is to compare the influence on delays in the tuberculosis case-finding process according to the types of medical facilities initially visited. The subjects include 107 patients 16 years and older who were diagnosed with bacteriologically confirmed pulmonary tuberculosis at nine tuberculosis specialized facilities in Ulaanbaatar, Mongolia from May 1995 to March 1996. Patients were interviewed about their demographic and socioeconomic factors and their medical records were reviewed for measuring delays. Fifty-five patients initially consulted general physicians and the remaining 52 patients initially visited other types of facilities including tuberculosis specialized facilities. Patients who initially consulted general physicians had shorter patient's delays and longer doctor's delays than those who had visited other facilities first. Since the reduction of patient's delay outweighs the extension of doctor's delay among patients who initially consulted general physicians, their total delay was shorter than that of patients who visited other facilities first. The beneficial influence of consulting general physicians first on the total delay was observed after adjusting for patient's age, sex, residence area, family income and family history of tuberculosis. This finding indicates that general physicians play an important role in improving the passive case-finding process in Mongolia. *J Epidemiol*, 1997; 7 : 93-98.

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Tuberculosis is still a serious health problem in the world. It is estimated that 90 million new tuberculosis cases and 30 million tuberculosis deaths will occur during the 1990s under the present level of tuberculosis control¹. A passive case-finding process is an important tuberculosis control measure². The notion of delays has been introduced for a quantitative assessment of passive case-finding^{3,4}. According to this idea, the time lapse from the onset of disease until the start of effective treatment, which is called total delay, is divided into two parts. The first part is called patient's delay, i.e. the time interval from the onset of symptoms of the disease until the first visit to a medical facility, and the second part is doctor's delay, i.e. the time interval from the first visit to a doctor to the start of treat-

ment under a proper diagnosis⁵. From an epidemiologic point of view, it is important to reveal a variety of factors influencing individual delays and identify factors amenable to intervention. Several studies have reported influence of demographic and socioeconomic characteristics, and laboratory examination findings of patients^{6,12}. Furthermore, various health care systems seem to influence delays differently. For example, the patient's delay was shorter than the doctor's delay in Japan where most tuberculosis patients initially consulted general physicians⁶. On the other hand, the patient's delay was longer than the doctor's delay in Korea where more than half of the patients initially visited health centers which function as specialized diagnosing facilities⁸. The comparison suggests that

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types of facilities initially visited may differently influence the delays of case-finding process. Analysis of delays focusing on influence of health care systems seems to be useful for developing countries in order to organize scarce health care resources efficiently. Some authors^{4,12} referred to the relationship between health care system and delays, but there have been few studies focusing on this issue in detail.

Recent Mongolian political, social and economic changes, which began in 1989, have had a great impact on its health care system. Reorganization of the system is on its way to adequate performance. Before the collapse of the communist style regime, since all Mongolian doctors were specialists managing specific diseases, tuberculosis specialists were only the doctors who were responsible for case-finding of tuberculosis patients. In 1993, a new category of doctors called family physicians or general physicians were introduced to the reforming health care system. The new system began working in 1994 and general physicians play an active and important role in the detection of tuberculosis patients at the present time.

The objective of this study is to evaluate the contribution which general physicians make in the case-finding process of tuberculosis in Mongolia. Patient's, doctor's and total delays of case-finding are compared between patients who initially consulted general physicians and those who visited various specialists first.

MATERIALS AND METHODS

The eligible subjects of this study are the tuberculosis patients who were newly registered at the nine specialized tuberculosis facilities in Ulaanbaatar, Mongolia from May 1995 to March 1996. A total of 618 patients were registered as having active tuberculosis at the facilities during the study period. Of them, patients with extra-pulmonary tuberculosis (N=135) were excluded. Of 483 pulmonary tuberculosis patients, those aged 15 years and younger (N=119) were excluded because most of them were diagnosed without undergoing bacteriological examination. Of 364 pulmonary tuberculosis patients aged 16 years and older, those with negative findings of bacteriological examinations (N=231), those who had not undergone bacteriological examinations (N=20) and those with unknown dates of initial symptoms (N=6) were excluded. Therefore, this study included 107 patients aged 16 years and older who had bacteriologically confirmed pulmonary tuberculosis. Ninety-eight percent of the 107 patients underwent chest roentgenographic examinations. The most frequent X-ray finding was alveolar infiltrates (51%) and existence of cavities was confirmed for 47% of the patients.

A skilled medical staff of the Center for Tuberculosis of Mongolia visited the facilities where eligible patients were registered and interviewed them within a few days after commencement of treatment. In the interview survey, each patient

was asked what facility he/she had visited first for medical advice. Medical facilities were classified into four categories; general physician clinics, tuberculosis specialized facilities (tuberculosis dispensaries and tuberculosis hospitals), non-tuberculosis specialized facilities (state and general hospitals, health consulting centers, and maternal and child health care centers), and emergency care facilities. Other study variables include demographic factors such as age and sex, socioeconomic factors such as residence area and family income (monthly income per family member), family history of tuberculosis and symptoms at the onset of tuberculosis and those when the diagnosis was confirmed. In order to calculate the delays in the case-finding process for each patient, the first author reviewed the patient's medical record to obtain the dates of the onset of symptoms, of the first consultation with a doctor, and of the beginning of treatment under the confirmed diagnosis of tuberculosis.

In the analysis, the medians of patient's, doctor's, and total delays were compared by types of facilities which patients had initially consulted. Statistical significance of differences in medians between patients who had initially consulted general physicians and those who had initially visited other facilities was tested using the Mann-Whitney U test. In order to examine the association between the type of medical facility initially visited and each delay while adjusting for other study variables, a multiple logistic regression analysis including all the study variables simultaneously was conducted. The analysis was performed using the version 6.1 of the Statistical Package for the Social Sciences (SPSS) for Windows.

RESULTS

Table 1 shows distribution of age, sex, residence area, family income, family history of tuberculosis, and types of physicians initially consulted. More than half of the patients (54%) were male. Fifty percent of the patients were under 30 years of age and the mean age was 33 years old. Seventy-two patients (67%) lived in urban areas. Sixty-four patients (60%) belonged to low income families; income less than 5,000 tugriks (equivalent to 12 US dollars in 1995) per month per family member. Twenty-three patients (21%) had a history of contact with family members suffering from tuberculosis. For types of physicians initially consulted, 55 patients (51%) consulted general physicians first, 21 patients (20% of all patients, 40% of 52 patients who initially visited doctors other than general physicians) consulted tuberculosis specialists first and 26 patients (24% of all patients, 50% of 52 patients who initially visited doctors other than general physicians) initially consulted non-tuberculosis specialists.

Table 2 shows the cumulative distributions of patient's delay, doctor's delay and total delay by types of physicians initially contacted. For all patients, fifty-three patients (49%) con-

Table 1. Distribution of demographic, socioeconomic, and clinical factors.

| Factor | number | % |
|--|--------|------|
| Sex | | |
| Male | 58 | 54.2 |
| Female | 49 | 45.8 |
| Age | | |
| 16-19 years | 11 | 10.3 |
| 20-29 | 43 | 40.2 |
| 30-39 | 25 | 23.4 |
| 40-49 | 13 | 12.1 |
| 50-59 | 9 | 8.4 |
| 60-80 | 6 | 5.6 |
| Residence area | | |
| Urban | 72 | 67.3 |
| Rural | 35 | 32.7 |
| Income per family member per month | | |
| < 5000 tugriks † | 64 | 59.8 |
| ≥ 5000 tugriks | 43 | 40.2 |
| Family history of tuberculosis | | |
| Having | 23 | 21.5 |
| Not having | 84 | 78.5 |
| Types of facilities initially visited | | |
| General physician clinics | 55 | 51.4 |
| Tuberculosis specialized facilities | 21 | 19.6 |
| Facilities specializing diseases other than tuberculosis | 26 | 24.3 |
| Emergency care facilities | 5 | 4.7 |
| Diagnosing facilities | | |
| General physician clinics | 0 | 0 |
| Tuberculosis specialized facilities | 87 | 81.3 |
| Facilities specializing diseases other than tuberculosis | 19 | 17.8 |
| Emergency care facilities | 1 | 0.9 |

† The amount of 5000 tugriks was equal to 12 US dollars in 1995.

tacted physicians within one month after the onset of symptoms, 59 patients (55%) were diagnosed within one month after the initial medical consultation, and 51 patients (48%) were diagnosed within three months after the onset of symptoms. The median of patient's delay was nearly equal to that of doctor's delay. For patients who initially visited general physician clinics (N=55), 29 patients (53%) contacted physicians within one month after the onset of symptoms, 26 patients (47%) were diagnosed within one month after initial medical consultation, and 31 patients (56%) were diagnosed within three months after the onset of symptoms. Patients who initially visited tuberculosis specialists (N=21) had a distribution of total delay similar to that of patients who initially visited non-tuberculosis specialists (N=26). The proportions of patients who were diagnosed within three months after the onset of symptoms were identical; 38 percents in both groups. When three types of patients who had initially visited facilities other

than general physician clinics were combined into one category (N=52), 24 patients (46%) contacted medical doctors within one month after the onset of symptoms, 33 patients (63%) were diagnosed within one month after the initial medical consultation, and 20 patients (38%) were diagnosed within three months after the onset of symptoms. In comparison of medians of delays between those who visited general physicians first and those who initially visited other three types of facilities, the median of patient's delay of the former was about half that of the latter. Since the reduction of patient's delay outweighs the extension of doctor's delay, the total delay was shorter among patients who initially consulted general physicians than among those who visited facilities other than general physician clinics first.

Table 3 presents associations between other study variables and delays. No factors were found to be significantly associated with the delays except for age. Patients at 29 or younger ages had an extended total delay.

Table 4 presents the results of multiple logistic regression analyses examining associations between types of physicians initially consulted and each delay while simultaneously adjusting for other study variables. Odds ratios presented are for patient's delay of more than one month, doctor's delay of more than one month, and total delay of more than three months. We chose each point as a convenient number of month nearest to the median of each delay. Patients who initially consulted general physician clinics remained to have a reduced total delay; the adjusted odds ratio of total delay of three months or more was 0.65 (95% confidence intervals, 0.43-0.98) relative to those who first visited other facilities. Although the pattern of associations between other study variables and each delay was similar to that observed in the univariate analysis, no association was statistically significant.

DISCUSSION

The importance of early detection of tuberculosis is that the disease is curable if detected, complicated if prolonged, and may be fatal if undiagnosed^{6,14,15}. A prolonged delay brings family clusters of tuberculosis patients, too¹⁶. In this study, the authors focused on differing influence of various types of medical facilities initially visited on delays in the case-finding process. The finding is useful to develop an efficient tuberculosis control program in Mongolia where patients are able to consult a variety of medical doctors under the present health care system.

Patients who initially consulted general physicians had a significantly shorter total delay than those who initially visited various specialists including tuberculosis specialists. The reduction of total delay is attributable to a shortened patient's delay among the former patients. Although consulting general physicians first tends to extend doctor's delay, the reduction in

the patient's delay outweighs the extension and results in a shortened total delay. The beneficial effect of first consultation with general physicians on total delay was independent of those of demographic factors, socioeconomic factors and the family history of tuberculosis. Therefore, the effect is relevant to characteristics of care provided by general physicians. General physicians may positively influence patients' self-motivation for seeking medical advice through accessibility and comprehensiveness.

An inverse correlation between patient's delay and doctor's delay has been reported ⁴. The finding that the patients who initially consulted general physicians had a longer doctor's delay than those who initially visited various specialists is consistent with this observation. If general physicians could reduce the doctor's delay, they would make more contribution to shortening total delays. General physicians should always consider tuberculosis in the diagnosis of any unexplained illness ⁹.

Since initial consultation with general physicians reduces

the total delay, the new medical care system introducing general physicians will make a contribution to not only reducing the mortality but also decreasing the incidence of tuberculosis. Except for the transitional period to the democratic society, the mortality of tuberculosis in Mongolia shows a downward trend ¹⁰. In 1980s governed by the communist style regime, the mortality rate (per 10,000 persons) decreased from 0.77 in 1981 to 0.69 in 1988. During the period of the political revolution, the rates ranged between 0.68 in 1989 and 0.55 in 1993. Since the new medical care system incorporating general physicians began working, the mortality rate has shown a downward trend again from 0.57 in 1994 to 0.47 in 1995.

On the other hand, variability of numbers of the notified cases ¹⁰ makes it difficult to examine the trend in the incidence. Before the collapse of the communist style regime, the number of notified tuberculosis was gradually decreasing from 2,994 in 1985 to 2,233 in 1989. It suddenly dropped to 1,659 in 1990 and was as low as 1,418 in 1993. After that, the number

Table 2. Cumulative distribution and medians of patient's, doctor's, and total delays by types of facilities initially visited.

| | Cumulative distribution (%) | | | | | | Median day |
|---|-----------------------------|---------|----------|----------|----------|-----------|------------|
| | Duration | | | | | | |
| | 2 weeks | 1 month | 2 months | 3 months | 6 months | >6 months | |
| Patients who initially visited general physician clinics (N=55) | | | | | | | |
| Patient's delay | 34.5 | 52.7 | 72.7 | 81.8 | 92.7 | 100 | 28.6 |
| Doctor's delay | 30.9 | 47.3 | 70.9 | 83.6 | 94.5 | 100 | 34.5 |
| Total delay | 1.8 | 12.7 | 41.8 | 56.4 | 83.6 | 100 | 77.9 |
| Patients who initially visited facilities other than general physician clinics | | | | | | | |
| Patients who visited tuberculosis specialists (N=21) | | | | | | | |
| Patient's delay | 28.6 | 47.6 | 52.4 | 66.7 | 81.0 | 100 | 46.0 |
| Doctor's delay | 42.9 | 66.7 | 76.2 | 76.2 | 85.7 | 100 | 19.8 |
| Total delay | 9.5 | 23.8 | 33.3 | 38.1 | 61.9 | 100 | 136.0 |
| Patients who visited non-tuberculosis specialists (N=26) | | | | | | | |
| Patient's delay | 23.1 | 42.3 | 50.0 | 57.7 | 76.9 | 100 | 61.0 |
| Doctor's delay | 42.3 | 61.5 | 61.5 | 69.2 | 84.6 | 100 | 21.4 |
| Total delay | 7.7 | 11.5 | 30.8 | 38.5 | 50.0 | 100 | 181.0 |
| Patients who visited emergency care facilities (N=5) | | | | | | | |
| Patient's delay | 20.0 | 60.0 | 60.0 | 60.0 | 100 | 100 | 27.0 |
| Doctor's delay | 60.0 | 60.0 | 80.0 | 80.0 | 100 | 100 | 11.7 |
| Total delay | 0 | 20.0 | 40.0 | 40.0 | 100 | 100 | 106.0 |
| Three types of patients combined (N=52) | | | | | | | |
| Patient's delay | 25.0 | 46.2 | 51.9 | 61.5 | 80.8 | 100 | 51.0 |
| Doctor's delay | 44.2 | 63.5 | 69.2 | 73.0 | 86.5 | 100 | 19.8 |
| Total delay | 7.7 | 17.3 | 32.7 | 38.5 | 59.6 | 100 | 140.1 |
| All patients (N=107) | | | | | | | |
| Patient's delay | 29.9 | 49.5 | 62.6 | 72.0 | 86.9 | 100 | 32.1 |
| Doctor's delay | 37.4 | 55.1 | 70.1 | 78.5 | 90.7 | 100 | 26.4 |
| Total delay | 4.7 | 15.0 | 37.4 | 47.7 | 72.0 | 100 | 99.7 |

Table 3. Median days of patient's, doctor's and total delays by demographic and socioeconomic factors and family history of tuberculosis.

| Variable | Patient's delay | Doctor's delay | Total delay |
|---------------------------------------|-----------------|----------------|-------------|
| Sex | | | |
| Male | 35.3 | 24.6 | 91.0 |
| Female | 30.0 | 28.3 | 106.0 |
| Age | | | |
| ≤ 29 years | 43.9 | 26.4 | 129.6 |
| ≥ 30 years | 26.6 | 26.3 | 64.8* |
| Residence | | | |
| Urban | 27.6 | 25.2 | 91.0 |
| Rural | 48.5 | 28.0 | 119.1 |
| Family income | | | |
| Low | 34.3 | 27.8 | 103.0 |
| High | 29.7 | 21.0 | 95.1 |
| Family history of tuberculosis | | | |
| Having | 27.0 | 29.7 | 130.4 |
| Not having | 33.3 | 24.8 | 88.0 |

* : p value of Mann-Whitney U test < 0.05

increased to 2,700 in 1995. About two fold increase in the notified cases in three years from 1993 to 1995 are unlikely to be associated with the epidemiologic situation of tuberculosis, but rather due to a reporting bias¹⁹. It may be worth explaining the reasons of such a large fluctuation of notified numbers after 1990. During the period of the communist style regimen, Mongolia imported antituberculosis drugs from Eastern European countries and the former Soviet Union. Economic hardships accompanying the political reforms in these countries brought shortages of antituberculosis drugs to Mongolia where democratization had begun in 1989. The lack of drugs prevented doctors, in particular specialists treating diseases other than tuberculosis, from notifying the registry of patients, because notification did not lead to treating the disease. The improvement of economic conditions and the supply of essential drugs since 1994 seems to contribute to the increase in the number of notified cases. Other factors potentially influencing the increase in the tuberculosis incidence are malnutrition and poor living conditions accompanied by social and economic changes²⁰. Coexistence of a variety of factors makes it difficult to interpret the influence of the new medical care system on the recent trend in tuberculosis notification.

A few caveats of this study are in order. Firstly, severity of tuberculosis was not considered in this study. Associations

Table 4. Results of multiple logistic regression analyses showing the associations between types of facilities initially consulted and individual delays when adjusting for other variables.

| Variable | Category | > 1 month patient's delay | | > 1 month doctor's delay | | > 3 months total delay | |
|--------------------------------|-------------------|---------------------------|-----------|--------------------------|-----------|------------------------|-----------|
| | | OR | 95%CI | OR | 95%CI | OR | 95%CI |
| First facility | General physician | 0.85 | 0.57-1.26 | 1.40 | 0.94-2.09 | 0.65* | 0.43-0.98 |
| | Others † | 1.0 | | 1.0 | | 1.0 | |
| Age (years) | ≤ 29 | 1.26 | 0.85-1.86 | 1.08 | 0.73-1.60 | 1.49 | 0.99-2.24 |
| | 30-80 † | 1.0 | | 1.0 | | 1.0 | |
| Sex | Male | 1.07 | 0.71-1.61 | 1.00 | 0.66-1.50 | 0.92 | 0.60-1.40 |
| | Female † | 1.0 | | 1.0 | | 1.0 | |
| Residence | Rural | 1.44 | 0.91-2.27 | 0.98 | 0.62-1.53 | 1.32 | 0.82-2.12 |
| | Urban † | 1.0 | | 1.0 | | 1.0 | |
| Family income | Low | 0.92 | 0.60-1.42 | 1.00 | 0.65-1.54 | 0.97 | 0.62-1.52 |
| | High † | 1.0 | | 1.0 | | 1.0 | |
| Family history of tuberculosis | Having | 1.00 | 0.62-1.61 | 1.08 | 0.67-1.75 | 1.51 | 0.90-2.53 |
| | Not having † | 1.0 | | 1.0 | | 1.0 | |

* p<0.05

OR : odds ratio of delay

CI : confidence interval

† : reference category

between the types of medical facilities initially visited and delays may be different between patients with severe tuberculosis and less severe cases. Unfortunately, information on the severity of tuberculosis such as sputum examinations and the degrees of symptoms was not available to this study. Secondly, the observed findings are for pulmonary tuberculosis patients aged 16 years and older. Caution must be exercised in generalizing the finding to extra-pulmonary tuberculosis and tuberculosis at younger ages. Further, although the tuberculosis notification of the recent years has improved, the notification seems to be far from completeness. The study subjects may not represent the target population.

In spite of these caveats, this study indicates that general physicians can make a contribution to improving tuberculosis control programs through shortening patient's and total delays of the passive case finding process in Mongolia.

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