

MEDICAL CHARACTERISTICS AND TUBERCULOSIS TREATMENT OUTCOMES IN AN URBAN TERTIARY HOSPITAL, THAILAND

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Abstract. The purpose of this study was to describe medical characteristics and assess treatment outcomes at a respiratory clinic, tertiary hospital, Bangkok, Thailand. One hundred seventy-seven patients diagnosed as having any type of TB and having taken anti-TB drugs for one month were included in the study. The patients were interviewed the end of the first month and their medical files were reviewed at the end of treatment to obtain the treatment outcome. Descriptive statistics and chi-square test were used in the data analyses. Of the total of 177 patients, 33.3% were new smear-positive, 19.2% were new smear-negative, 18.1% were extra-pulmonary TB, and 29.4% were other. The prevalence of TB/HIV co-infection was 33% (18 of 54). Resistance to at least one anti-TB drug was 31.6% (6 of 19). Due to high treatment default rates, treatment completion rates were low, 64.4% in new smear-positives, 61.8% in new smear-negatives, 71.9% in extra-pulmonary TB, and 46.2% in other. Treatment default rates significantly differed among the four types of TB ($\chi^2 = 8.3$, $p = .04$). The findings indicate a high proportion of extra-pulmonary TB, high prevalence of TB/HIV co-infection, and low treatment completion in urban TB patients at the tertiary hospital. Interventions are needed to integrate the strengths of the tertiary hospital regarding the availability of chest specialists and advance diagnostic tools into the other levels of health service to improve treatment outcomes in urban populations.

INTRODUCTION

During the past century, rapid urban growth has been one of the most important demographic shifts worldwide (Galea and Vlahov, 2005). The world's population living in urban areas increased from 5% in 1900 to 46% in 1999 (Brockhoff, 2000; Guidotti *et al*, 2001). Urban communities are generally the centers of government, education, commercial interests and they promise better education, jobs, and standards of infrastructure (Schell and Ulijaszek, 1999; Satterthwaite, 2000). The range of opportunities available in urban settings has led to

massive urban population growth. Rapidly urban growth is accompanied by a negative impact on quality of life, such as overcrowding, stress, traffic, poverty, crime, violence, and drug abuse (Vlahov and Sandro, 2002). These negative impacts then increase health risks among urban populations.

It is evident that physical, economic, social, and cultural aspects of urban life affect TB control programs. The prevalence of TB infection among Indian children less than nine years of age is as high as 14.1% (Chadha *et al*, 2003). In the urban poor settlements in the Philippines, the proportion of smear positive cases is higher (6.7/1,000) than in the general urban population (4.1/1,000) (Tupasi *et al*, 2000). Multidrug resistant TB (MDR-TB), defined as resistance to at least both rifampicin and isoniazid, among patients with a history of TB treatment in India has been reported to be 67% in urban communities (Almeida *et al*, 2003).

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By 2015, 36.7% of the Thai population is expected to be living in urban areas (Department of Economic and Social Affairs, 2004). Thailand has also been challenged to control TB in urban areas (WHO, 2004a). Basic information about patients and TB among urban Thai patients in the health sector, which is not routinely monitored by the National TB Program (NTP), is limited. Understanding this demographic and medical information may provide an opportunity to develop more efficient and effective ways of controlling TB in the urban context. The purpose of this study was to describe the medical characteristics and assess the treatment outcomes of urban TB patients.

MATERIALS AND METHODS

Sample

This study is a secondary analysis of data from a previous study assessing the influence of process of care on treatment default among urban TB patients in Thailand (Jittimane, 2005). A sample of 177 TB patients who had been taking anti-TB drugs for one month was recruited from a respiratory clinic at a tertiary hospital in Bangkok. Patients were excluded if they were age less than 18 years old.

Setting

The original study was conducted in a 1,167-bed hospital in Bangkok, Thailand. Bangkok is the capital city with nine million people within an area of 1,568 km² (MOPH, 2002). The majority of TB patients visit the clinic once a month. There is an average of 100 patients per week receiving care for respiratory diseases, seen by 5 doctors at the clinic. There is an average of 10 new TB cases seen per week, with 30 to 40 cases receiving follow-up per week for TB. The Ethics Committee on Research of the study hospital approved the study and all patients provided written informed consent.

Definition (WHO, 2003)

New smear positive refers to a patient with at least one sputum specimen positive for acid-fast bacilli by microscopy who has never had treatment for TB or who has taken anti-tuberculosis drugs for less than one month.

New smear negative is defined as a patient

with sputum specimens negative for acid-fast bacilli by microscopy who has never had treatment for TB or who has taken anti-tuberculosis drugs for less than one month.

Extra-pulmonary TB refers to TB of organs other than the lungs.

Other is defined as a patient who does not meet the criteria to be classified as one of the above types. This type included patients with a history of TB treatment or patients who have been diagnosed by chest X ray without a sputum examination.

Procedure for data collection

Data collection had two phases. First, eligible participants were interviewed once at the end of the first month in a private room at the clinic after they saw the doctor. The interviews were conducted from December 2003 to June 2004. Second, during December 2004-January 2005, participants' medical files were reviewed to obtain treatment outcomes.

Data analysis

Descriptive statistics (frequencies, percentages, and means) were used to describe the demographic characteristics, medical characteristics, and treatment outcomes. A chi-square test was used to assess the differences between treatment completion and treatment default among the different types of TB.

RESULTS

Demographic characteristics

As shown in Table 1, half the patients were males (56.5%) and married (55.6%). The proportion of the patients who had completed primary school (six years of formal school education) was 44.0%, while 24.9% had completed high school (12 years formal schooling). Half the patients reported they lived with their friends or relatives (52.6%), while a few (4.5%) lived alone. About 41% of the patients reported that they lived in their own house or their parent's house. Relocation, a change of residence, was found in 35.6% of the patients. The patients' ages ranged from 18 to 81 years, with a mean age of 39 years (SD = 14.9).

Medical characteristics

Of the 177 patients, 59 (33.3%) were new

Table 1
Demographic characteristics by type of TB.

Characteristics	Pulmonary TB				Extra- Pul TB (n=32)	Other (n=52)	Total (n=177)			
	New SM+ (n=59)		New SM- (n=34)							
	n	(%)	n	(%)	n	(%)	n	(%)		
Sex										
Male	38	(64.4)	16	(47.1)	12	(37.5)	34	(65.4)	100	(56.5)
Female	21	(35.6)	18	(52.9)	20	(62.5)	18	(34.6)	77	(43.5)
Marital status										
Single	17	(28.3)	12	(35.3)	13	(40.6)	16	(30.8)	58	(32.6)
Married	36	(60.0)	17	(50.0)	15	(46.9)	31	(59.6)	99	(55.6)
Divorced/separated/Widowed	7	(11.7)	5	(14.7)	4	(12.5)	5	(9.6)	21	(11.8)
Education										
Primary school	26	(44.0)	18	(52.9)	13	(40.9)	21	(40.4)	78	(44.0)
High school	11	(18.7)	7	(20.6)	14	(43.7)	12	(23.1)	44	(24.9)
Bachelor degree	9	(15.3)	4	(11.8)	1	(3.1)	11	(21.1)	25	(14.1)
Other	13	(22.0)	5	(14.7)	4	(12.5)	8	(15.4)	30	(16.9)
Current living arrangement										
Alone	3	(5.1)	1	(2.9)	4	(12.5)	5	(9.6)	13	(7.3)
Family	28	(47.5)	10	(29.4)	13	(40.6)	20	(38.5)	71	(40.1)
Other	28	(47.5)	23	(67.6)	15	(46.9)	27	(52.3)	93	(52.6)
Type of living place										
Owned house/parent's house	17	(28.8)	12	(35.2)	18	(56.3)	26	(50.0)	73	(41.2)
Relative's house	2	(3.4)	3	(8.8)	2	(6.3)	1	(1.9)	8	(4.5)
Rental house/apartment	22	(37.3)	9	(26.5)	8	(25.0)	16	(30.8)	55	(31.1)
Other	18	(30.5)	10	(29.4)	4	(12.5)	9	(17.3)	41	(23.2)
Move of residence within 2 years										
Yes	18	(30.5)	18	(52.9)	9	(28.1)	18	(52.9)	63	(35.6)
No	41	(69.5)	16	(47.1)	23	(71.9)	34	(65.4)	114	(64.4)
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)
Age	39	(13.7)	44	(18.4)	36	(15.2)	39	(13.6)	39	(14.9)

New SM+ = New smear positive; New SM- = new smear negative

smear-positive pulmonary TB, 34 (19.2%) were new smear-negative pulmonary TB, 32 (18.1%) had extra-pulmonary TB, and 52 (29.4%) were other. The group of others was patients with a history of TB treatment and those diagnosed by chest X ray without sputum examination. Of 32 extra-pulmonary TB cases, 14 were pleural, 16 lymphatic, and 2 bone/joint.

HIV status. The majority of patients had an unknown HIV serologic status (69.5%) (Table 2). Of 54 patients who knew their HIV status, 18 (33.3%) were HIV seropositive. Nine TB patients had been previously diagnosed with HIV infection prior to the diagnosis of TB. About 26.8% (45 of 168) of TB patients were offered an HIV

test and agreed to take the test. Of these, 20.0% (9 of 45) had their HIV infection diagnosed at the time of the TB diagnosis. There were only two TB patients with HIV infection who had been on antiretroviral therapy (ART) during TB treatment, five received trimethoprim-sulfamethoxazole in addition to TB treatment, and 11 did not receive any additional medications for HIV infection.

TB symptoms. Patients in the new smear-positive, new smear-negative, and other group frequently reported cough for more than two weeks (91.5, 70.6, and 76.9, respectively), fever (62.7, 52.9, and 55.8%, respectively), and breathlessness (59.3, 52.9, and 50.0%, respectively). Of

Table 2
Medical characteristics and treatment outcomes by type of TB.

Characteristics	Pulmonary TB				Extra-Pul TB		Other		Total	
	New SM+		New SM-		(n=32)		(n=52)		(n=177)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
HIV status										
Positive	8	(13.6)	4	(11.8)	1	(13.1)	5	(9.6)	18	(10.2)
Negative	7	(11.9)	6	(17.6)	15	(46.9)	8	(15.4)	36	(20.3)
Unknown	44	(74.6)	24	(70.6)	16	(50.0)	39	(75.0)	123	(69.5)
TB symptoms										
Chronic cough > 2 weeks										
Yes	54	(91.5)	24	(70.6)	14	(43.8)	40	(76.9)	132	(74.6)
No	5	(8.5)	10	(29.4)	18	(56.3)	12	(23.1)	45	(25.4)
Fever										
Yes	37	(62.7)	18	(52.9)	16	(50.0)	29	(55.8)	100	(56.5)
No	22	(37.3)	16	(47.1)	16	(50.0)	23	(44.2)	77	(43.5)
Hemoptysis										
Yes	29	(49.2)	13	(38.2)	5	(15.6)	23	(44.2)	70	(39.5)
No	30	(50.8)	21	(61.8)	27	(84.4)	29	(55.8)	107	(60.5)
Chest pain										
Yes	36	(61.0)	12	(35.3)	12	(37.5)	26	(50.0)	86	(48.6)
No	23	(39.0)	22	(64.7)	20	(62.5)	26	(50.0)	91	(51.4)
Breathlessness										
Yes	35	(59.3)	18	(52.9)	11	(34.4)	26	(50.0)	90	(50.8)
No	24	(40.7)	16	(47.1)	21	(65.6)	26	(50.0)	87	(49.2)
Medication side effects (n=172)										
No	50	(84.7)	22	(71.0)	26	(83.9)	42	(82.3)	140	(81.4)
1 symptom	8	(13.5)	7	(22.6)	3	(9.7)	5	(9.8)	23	(13.4)
2 symptoms	1	(1.8)	2	(6.4)	0		3	(5.9)	6	(3.5)
3 symptoms	0		0		2	(6.4)	1	(2.0)	3	(1.7)

Table 3
Treatment outcomes by type of TB.

Treatment outcomes	Pulmonary TB				Extra-Pul TB		Other		Total	
	New SM+		New SM-		(n=32)		(n=52)		(n=177)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Completed ^a	38	(64.4)	21	(61.8)	23	(71.9)	24	(46.2)	106	(59.9)
Failed ^b	3	(5.1)	0		0		0		3	(1.7)
Defaulted ^c	15	(25.4)	8	(23.5)	7	(21.9)	24	(46.2)	54	(30.5)
Transferred out ^d	0		3	(8.8)	1	(3.1)	1	(1.9)	5	(2.8)
Other ^e	3	(5.1)	2	(5.8)	1	(3.1)	3	(5.7)	9	(5.1)

^a completed, a patient who has completed treatment but who did not have a sputum smear result in the last month of the treatment; ^b failed, a patient who is sputum smear-positive at five months or later during treatment; ^c defaulted, a patient who missed medical appointments for two consecutive months or more; ^d transferred out, a patient who has been transferred to another unit or for whom the treatment outcome is not known; and ^e other, a patient who does not meet the criteria to be classified as one of these outcomes.

the new smear-positive and other patients, hemoptysis (49.2% of new smear-positive and 44.2% of other) and chest pain (61.0% of new smear-positive and 50.0% of other) were common. Half the patients (50.0%) with extra-pulmonary TB reported fever.

Drug resistant TB. Of the 63 patients who had at least a positive-sputum examination, 19 (30.2%) were tested for drug susceptibility to first-line anti-TB drugs. Resistance to at least one anti-TB drug was identified in 6 patients (31.6%). The percentage of drug resistance was 66.7% (2 of 3) in patients with a history of TB treatment and 25% (4 of 16) in those without a history of TB treatment. For two patients with a history of TB treatment, one had resistance to streptomycin and the other had MDR-TB. Among new cases, isoniazid resistance was identified in one patient, streptomycin resistance in one patient, and both isoniazid and streptomycin resistance in two patients.

Medication side effects. A history of medication side effects was not available for the five patients who transferred out. Of the remaining 172 patients, 32 (18.6%) reported experiencing at least one side effect at some point during the treatment period. On a monthly basis, 84.4% (27 of 32) developed at least one medication side effect in month 1, 6.2% (2 of 32) in month 2, and 9.4% (3 of 32) in month 4. About 47% (15 of 32) who experienced the medication side effects required at least one extra clinic visit. One symptom of medication side effects ($n = 23$) included skin rash ($n = 13$), nausea and/or vomiting ($n = 4$), hepatotoxicity ($n = 4$), blurred vision ($n = 1$), and hearing loss ($n = 1$). Two symptoms ($n = 6$) were: skin rash and hepatotoxicity ($n = 1$); nausea-vomiting and hearing loss ($n = 2$); and nausea-vomiting and skin rash ($n = 3$). Three symptoms ($n = 3$) were: skin rash, hepatotoxicity and decreased appetite ($n = 1$); and nausea-vomiting, hepatotoxicity, and blurry vision ($n = 2$).

Treatment outcomes

Treatment outcomes for all the patients are described in Table 3. Treatment completion was achieved in 64.4% of new smear-positive, 61.8% of new smear-negative, 71.9% of extra-pulmonary TB, and 46.2% of other patients. Treatment default rates were high in all the groups ranging

from 21.9% to 46.2%. However, the treatment default rate was highest in the group with the other types of TB. Proportions of patients who had treatment completion versus treatment default significantly differed among the four types of TB, $\chi^2(3, n = 160) = 8.3, p = 0.04$.

DISCUSSION

The results indicate that a demographic characteristic of urban TB patients slightly differed from general patients in respect to age. Urban patients were young, while the majority of TB patients in the general Thai population were older than 65 years (WHO, 2005). This observation has also been reported in past research indicating that TB patients in urban areas were more likely to be young with a mean age ranging from 34 to 43 years old (Udompanich *et al*, 2000; Srisaenpang, 2001). One possible reason may be that urban communities have a greater concentration of young adults because of the preference for young workers or the increased likelihood of younger people to relocate for work purposes.

This study raises two important issues regarding medical characteristics. The first relates to the high proportion of extra-pulmonary TB. This finding is a reversal of that reported by primary and secondary health care services, which reported only 4.7% (31 of 649) of cases were extra-pulmonary TB (Rim, 2005). Extra-pulmonary TB was more commonly found in tertiary hospitals. The hospital has specialists and diagnostic tools, such as specialized X rays or biopsy procedures, which are necessary to detect extra-pulmonary TB.

The other issue relates to the high proportion of HIV infection among TB patients. The finding of 33% HIV-positive TB patients was higher than national sentinel surveys ranging from 10% to 15% (WHO, 2005). The high prevalence of TB/HIV co-infection in the tertiary hospital should be given a high priority. The tertiary hospital is a place where the urban population, who are young and sexually active and more likely to engage in HIV risk behavior (Wenger, 1992), seek care. The tertiary hospital offers an opportunity to diagnose and treat HIV because of the availability of HIV counseling services and special-

ists in chest and infectious diseases. Thus, Voluntary Counseling and HIV Testing (VCT) for TB patients at tertiary hospitals should be introduced because VCT has several benefits. These benefits include: (1) better clinical management of co-infected patients; (2) provision of trimethoprim-sulfamethoxazole prophylaxis for the prevention of opportunistic infections; and (3) early recruitment of HIV-infected individuals into HIV care services (WHO, 2004b).

WHO (2005) reported that in 2002 the treatment success rate in Thailand, defined as cure plus completion, was low (74%) because of a high death rate (11%) and treatment defaults (13%). In the urban setting, treatment completion was poorer than the national average. In this study, the treatment completion rate was only 59.9% for all types of TB (106 of 177). Possible reasons for this low treatment completion rate may be due to high treatment default rate. First, the NTP is not routinely involved in this setting. Lack of involvement by the NTP may limit the capacity of the hospital in TB management, especially in recording and reporting, referral, and the defaulter tracing system. Second, the urban context, with young patients who are active workers, may contribute to low treatment completion. These young workers may not have time to come to the clinic during working hours due to a loss of wages if they come to the clinic (Jittimane, 2005). This is similar to the finding of another recent study in Bangkok in which most patients were young (Rim, 2005). Rim (2005) reported a high treatment default rate of 17.9% (44 of 246) at an urban health center, 18.3% (42 of 229) at a clinic specializing in TB, and 21.5% (37 of 172) at a private hospital.

It is important to highlight that that none of the patients in this study died during TB treatment. This finding is in contrast with the national mortality rate of 11% for all types of TB in 2002 (WHO, 2005). It would be tempting to suggest that a high technical quality of care in terms of availability of chest specialists, equipment, or more tests, could prevent deaths. It is therefore doubtful whether patients should be transferred from a tertiary hospital to a local primary health service which has a lower capacity and where mortality rates are higher.

Using patient health records as a primary source may limit the accuracy of information, especially major medication side effects. Doctor's notes indicated whether the patient had at least one major medication side effect. However, the patient may have had symptoms of major medication side effects but the doctor neglected to note them. Other limitations are the various methods of recording the data, such that there were inconsistencies from clinician to clinician. Finally, the diagnosis of "other" is a catch-all term and does not provide helpful information in determining TB patient or medical characteristics.

The primary implication is that tertiary hospitals offer major opportunities for TB control, because such hospitals have the capacity and potential to detect and treat complicated cases that often lead to preventable deaths. However, tertiary hospitals may pose a threat to effective TB control because they do not have the mechanism to ensure treatment completion, such as record keeping, a referral system, or a defaulter tracing system. Better integration of different health service levels into an urban TB control program may help to coordinate the strengths of the tertiary hospitals as a setting with a high technical quality of care and strength of local primary health services, which are convenient because they are close to the patients' homes. The NTP should be a focal point to develop this integration model since most tertiary hospitals in urban communities are outside the Ministry of Public Health. Specifically, a DOTS agency organized by a local NTP unit may be established to be responsible for delivery of TB care in a defined urban area. The strategy of the DOTS agency has been successfully demonstrated in other areas of TB control (WHO, 2001). The DOTS agency covers financing for training, supervision, supplies, maintenance of one TB registry, patient support services, patient referral, and a defaulter tracing system. A DOTS agency may reduce the workload regarding TB management at the tertiary hospitals and link health services at all levels.

In conclusion, this study identified issues surrounding urban TB patients at a tertiary hospital. These included high proportion of extra-

pulmonary TB cases, a high prevalence of TB/HIV co-infection, and a low treatment completion rate. Innovative approaches are needed to integrate the strengths of tertiary hospitals in terms of availability of specialists and advanced diagnostic tools, into other health service levels to improve TB control in this complex system.

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