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Health Care System Delay in Diagnosis and Treatment of Contagious Tuberculosis in I.R.IRAN - 2003

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ABSTRACT

Background: *Delays in diagnosis and start of effective treatment increase morbidity and mortality from tuberculosis (TB) as well as the risk of transmission in the community; therefore, an operational research directed at increasing our knowledge about the factors affecting these delays has an important role in improving the quality and effectiveness of National TB Programs (NTP).*

Materials and Methods: *This nation-wide cross-sectional study was based on a structured interview with 400 newly diagnosed sputum smear-positive pulmonary TB patients aged over 15, registered at district TB coordination units of the country in a 3-month period in 2003 (from Mid Feb. to Mid May), to determine "the factors affecting the health care system delay".*

Results: *Median Total delay was 92 days (range, 7 - 445). Medians of Patient delay and Health care system delay were 20 (range, 1-381) and 46 (range, 1-444) days respectively; consequently they had a significant difference ($p < 0.001$). In multivariate analysis, Health care system delay has shown significant increasing association with age ($p=0.039$), presence of at least a negative sputum smear for Acid Fast Bacilli during the course of disease ($p<0.001$), attendance in a private clinic as the first health care system ($p =0.01$), and history of chronic respiratory disease ($p =0.044$) as well as a decreasing association with the number of symptoms at the first visit ($p <0.001$) and taking sputum smear or chest X-ray at the first visit ($p <0.001$).*

Conclusion: *To reduce health care system delay, it is recommended that health care providers especially physicians in private sector be trained and retrained on TB* ***(especially on the mentioned points in the results)*** *at regular intervals.* ***(Tanaffos 2003; 2(8): 55-64)***

Key words: *Tuberculosis, Diagnostic delay, Treatment delay, Patient delay, Health care system delay, Iran*

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INTRODUCTION

One of the main objectives of tuberculosis control programs is to reduce tuberculosis transmission in the community through early detection of sputum smear-positive pulmonary tuberculosis (TB) cases and rapid administration of a full course of treatment (1). Delays in diagnosis and start of effective treatment which increase this risk (transmission) as well as the morbidity and mortality from TB (2,3) have been reported in both industrialized and developing countries and vary considerably, from 57 days in New York and 9.6 weeks in Vietnam to 33 weeks in Ghana (4,5,6).

In some countries, the main part of this delay is due to patient delay in attending health facilities like Tanzania (with 120 days Patient delay vs. 15 days health care system delay) (7); but there are also countries like Vietnam (with 7.1 weeks health care system delay vs. 3.1 weeks patient delay) (5), Ghana (with 18.1 weeks health care system delay vs. 12.8 weeks patient delay) (6), Botswana (with 5 weeks health care system delay vs. 3 weeks patient delay) (8) and Iran (with 93 days health care system delay vs. 12 days patient delay) (9) in which the main part of total delay is due to health care provider delay in diagnosis and treatment of the patients.

A number of factors have been identified that appear to influence delay in diagnosis and start of treatment. Thus an operational research directed at increasing our knowledge of the factors affecting delay to treatment has an important role in improving the quality and effectiveness of "National TB Programmes" (NTP).

In this paper, we present that part of data from a multi-country study investigating the factors affecting the health care system delay (the time period between the first presentation to a health care provider and the start of treatment for TB) in newly detected sputum smear-positive adult TB patients in Iran, a country with a well established, decentralized TB control programme.

MATERIALS AND METHODS

Design

In the year 2003, we conducted a nation-wide cross-sectional study which has been composed of both descriptive and analytical sections among newly detected sputum smear-positive pulmonary TB patients aged 15 years old and over, to determine "total, patient and health care system delays and their determinants". Although only the determinants of health care system delay are presented in this paper. Patients registering in district TB coordination units of the country in a three month period (mid February to mid May 2003) were formally invited to participate in the study by obtaining written informed consent.

Those who agreed to participate were interviewed within 2 weeks of starting the treatment by trained health staff (mainly Physicians who were District TB Coordinators), using a structured questionnaire in Persian language which had been pilot tested and modified before the starting the data gathering phase of the study.

The following variables were collected from each patient (400 cases) who participated in the study: dates of symptom onset, patient's first consultation with a health care provider, diagnosis and initiation of anti-tuberculosis treatment. General data (age, sex and nationality), socio-demographic characteristics (i.e. number of household members, roofed home surface, occupation, and educational level) and type of symptoms at the first visit in a health care facility and also during the course of illness were recorded. The patients were also asked about their knowledge regarding the symptoms, transmission and curability of disease, previous contacts with TB cases, being affected by chronic diseases (i.e. DM and Chronic respiratory diseases), and access to health facilities (HF) type of the 1st health care unit the patient attended there and specialty of the 1st physician/staff who visited the patient, having negative smear(s) for AFB during the course of disease and also the

patients declared reasons for delay in attendance a HF.

Definitions

Sputum smear-positive pulmonary tuberculosis case is defined as a patient having one of these conditions: (a) two or more initial sputum smear examinations positive for AFB, (b) one sputum smear examination positive for AFB plus radiographic abnormalities consistent with active pulmonary TB as determined by a clinician or (c) one sputum smear positive for AFB plus positive sputum culture for mycobacterium tuberculosis (10).

New pulmonary TB case is defined as a patient who has never received anti-tuberculosis treatment or who has received anti-tuberculosis drugs for less than 1 month (10).

Patient delay is defined as the time interval between onset of symptoms and the first presentation to a health care provider. Health care system delay is defined as the time interval between the first presentation to a health care provider and the start of treatment for TB. This delay (Health care system delay) can be attributed to diagnostic delay and treatment delay. Health care system diagnostic delay is the time interval between the first presentation to a health care provider and the diagnosis of TB, while treatment delay is the time interval between the diagnosis of TB and the start of anti-tuberculosis treatment. Total delay is the time interval between onset of symptoms and the start of anti-TB treatment (These definitions are shown in figure 1). A day was chosen as the basic unit of time delay.

Statistical analysis

SPSS version 9 was used for data analysis. Because of the skewed distribution of dependent variables, summary data is mainly given as median and logarithmic transformation of values for delays was done for bivariate and multivariate analysis. For bivariate analysis, t test and ANOVA were used for nominal, while Spearman and Pearson's correlation tests were used for ordinal and continuous independent variables. Meanwhile Mann-Whitney, Kruskalwallis, and X2 tests were used for investigating probable association between some of independent variables. Two-sided tests were used, and a P-value less than 0.05 was considered statistically significant. All risk factors which were significant or had a p value less than 0.2 in the bivariate analysis were entered into the linear multiple regression model using a stepwise selection (11).

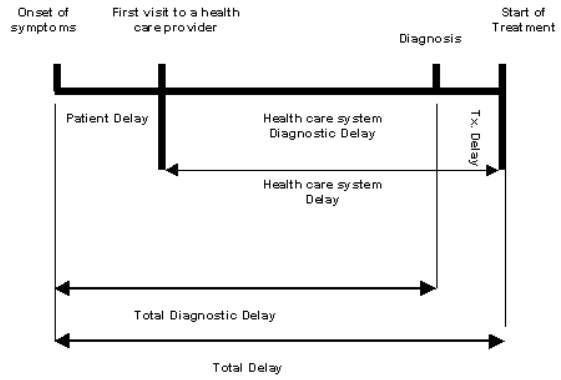

Figure 1. Components of time delay from the onset of symptoms to the start of treatment in patients with sputum smear-positive pulmonary TB. (TX= Treatment)

RESULTS

Four hundred patients were included in the study. There were 195 (48.8%) male and 205 (51.2%) female patients. The median age of the patients was 46 years (range 15–85). The patients, characteristics are shown in Table 1.

The medians for patient, health care system and total delays are presented in Table 2. As it can be seen, median Total delay was 92 days (range 7-445). Medians of patient delay and health care system delay were 20 (range 1-381) and 46 (range 1-444) days respectively. Consequently, health care system delay was significantly longer than patient delay. ($p<0.0001$).

Table 1. Patient characteristics

	n (% or range)	
Age (years):		
15-24	80	(20)
25-34	62	(15.5)
35-44	49	(12.3)
45-54	45	(11.3)
55-64	70	(17.5)
65+	93	(23.3)
Median (range)	46	(15-85)
Sex (Male)	195	(48.8)
Nationality (Iranian)	339	(84.8)
Occupation:		
Technical/Professional	20	(5)
Clerical/Worker	120	(30)
Student	16	(4)
Jobless	121	(30)
Housewife	123	(31)
Median of Household Member(range)	6	(1-35)
Roofed Home Surface(m^2) to Household members	13.3	(0-300)
Area of residence (Urban)	210	(52.5)
Patient Educational Level:		
University or higher	10	(2.5)
Primary/ Intermediate/ High School	134	(34)
Illiterate / read & write	254	(63.5)
Marital Status:		
Married	260	(65)
Single	76	(19)
Divorced	6	(1.5)
Widow	57	(14.5)

	n (% or range)	
Previous Exposure to TB	153	(39)
History of Chronic Diseases:		
known HIV+	1	(0.3)
DM	32	(8)
Chronic Respiratory Dis.	36	(9)
Physical Disability	9	(2.3)
Smoking Status:		
Non Smoker	263	(68)
Current or Ex-Smoker	124	(32)
Frequency of symptoms:		
Cough	392	(98)
Fever	331	(83)
Haemoptysis	122	(30.5)
Chest pain	295	(74)
Dyspnea	211	(53)
Low appetite	330	(82.5)
Weight loss	341	(85)
Fatigue	338	(84.5)
Others	106	(26.5)
First action of patient :		
Self treating / traditional healer	43	(11)
Attend a health facility	357	(89)
First health facility attended:		
Private clinic	270	(67.5)
Health house or health center	59	(14.8)
District TB center	13	(3.3)
Social Insurance org. health center	11	(2.8)
Hospital (inpatient)	12	(3)
Others	35	(8.6)
Knowledge of patient on TB:		
Low		
Mid		
High		

Table 2. Diagnostic and treatment delays in 400 new sputum smear-positive pulmonary TB patients

	Median Delay(day)	Mean (Range)
Total Delay	92	123 (7 – 445)
Total Diagnostic Delay	89	120 (3 – 442)
Treatment Delay	2	3.14 (-19 – 58)[?]
Total Delay	92	123 (7 – 445)
Patient delay	20	44 (1 – 381)
Health care system delay	46	79 (1 – 444)
Health care system delay	46	79 (1 – 444)
Health care system diagnostic Delay	46	76 (1 – 441)
Treatment Delay	2	3.14 (-19 – 58)[?]

[?] The negative numbers changed to zero before calculation of summary values.

The median number of visits before diagnosis was 4 (" 0 – 31" - with one outliner which had reported 81 visits, mean=5). The distribution is shown in figure 2.

Determinants for health care system delay

As Health care system delay was the main part of Total delay in diagnosis and treatment of TB, we tried to investigate the factors affecting this part of delay.

In bivariate analysis, Health care system delay did not vary in regard to the following factors: being resident in a region of the country with high TB prevalence, area of residence, number of household members, the ratio of roofed home surface area to the number of household members, patient's education, smoking status, Diabetes Mellitus (DM), and access to health facilities.

The summary of the results of this analysis, which are presented in table 4-shows that "sex; age; nationality; occupation; being feeder of the family; marital status; history of close contact with a pulmonary TB case; presence of cough, fever, weight loss, haemoptysis, chest pain, number of symptoms, presence of cough for more than 3 weeks, taking sputum smear and chest X-ray "in the first visit to health care facilities"; duration of patient delay; the first action of patient to disease; the speciality of first medical doctor who visited the patient; patient's knowledge about TB curability; presence of at least one negative direct microscopy for AFB during the period of illness and attendance in a private clinic as the first health care system, all had significant association with health care system delay.

However, after multivariate analysis (see Table 5), we found that only 5 of these variables i.e. age (increase), number of symptoms in the first visit to a clinic (decrease), taking sputum smear in the first visit (decrease), taking Chest X-ray in the first visit (decrease), having at least one negative direct microscopy for AFB during the course of disease (increase), and attendance in a private clinic as the first health care system (increase) have kept their significant effects and one more independent variable (history of chronic respiratory disease) which had not shown significant effect in bivariate analysis presents its increasing influence on health care system delay (p=0.044).

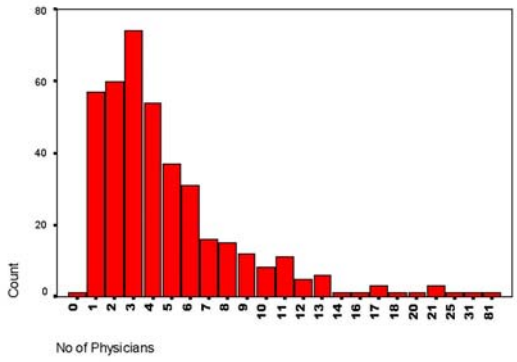

Figure 2. Distribution of number of visits before diagnosis

Table 3. Factors showed association with Health care system delay among 400 new sputum smear-positive pulmonary TB patients (Iran – 2003) in *Bivariate Analysis*

	n	Median Health Care System Delay (days)	P value
Sex : (Male vs. Female)	195 vs. 205	36 vs. 60	0.003
Age			0.000*
Nationality :			
Iranian vs. Non-Iranian	339 vs. 61	51 vs. 30	0.04
Feeder:			
Non-feeder vs. feeder	231 vs. 164	53 vs. 38	0.017
Marital Status:			
Single	76	33	
Married	260	55	0.016
Divorced	6	12	
Widow	57	52	
Pulmonary close contact in recent 2 years:			
(No vs. Yes)	331 vs. 56	53 vs. 32	0.024
Patient delay			0.000
Symptom at the 1st visit			
Cough (No vs. Yes)	30 vs. 370	68 vs. 45	0.006
Fever (No vs. Yes)	152 vs. 248	58 vs. 38	0.000
Cough & fever (No vs. Yes)	169 vs. 231	60 vs. 36	0.000
Weight loss (No vs. Yes)	185 vs. 215	62 vs. 33	0.000
Haemoptysis (No vs. Yes)	351 vs. 49	53 vs. 21	0.000
Chest pain (No vs. Yes)	202 vs. 198	56 vs. 33	0.000
Number of symptoms at the 1st visit			0.000*
Taking CXR at the 1st visit (No vs. Yes)	333 vs. 67	54 vs. 5	< 0.001
Taking sputum smear at the 1st visit (No vs. Yes)	301 vs. 99	58 vs. 4	<0.001
Cough more than 3 weeks at the 1st visit			
(No vs. Yes)	230 vs. 160	54 vs. 38	0.003
First action of patient:			
Self medication / traditional healers	43	25	0.003
Attend a Health Facility	357	50	
Attending a private clinic as the 1st visit			
(No vs. Yes)	130 vs. 270	32 vs. 53	
Specialty of the 1st medical doctor			
GP or Other specialties	304	56	0.018
TB Related Specialties	79	36	
Pre-knowledge	225 vs. 168	53 vs. 40	0.03
Having at least a negative direct microscopy for AFB			
(No vs. Yes)	349 vs. 51	38 vs. 123	0.000*

* These variables have kept their significancy in the multivariate analysis.

Table 4. Factors showed association with Health care system delay among 400 new sputum smear-positive pulmonary TB patients in (Iran – 2003) *Multivariate Analysis*

	Beta coefficient	P value
Constant	53.41	0.000
Female Sex	1.23	0.058*
Number of symptoms at the 1st visit	- 1.2	0.000
Taking CXR at the 1st visit	- 4.18	0.000
Having at least a negative direct microscopy for AFB	2.65	0.000
Age	1.01	0.039
History of chronic respiratory disease	1.47	0.044

* For doing Sex adjustment, it has been kept in the model by "Enter Selection".

DISCUSSION

Delays in tuberculosis treatment which can originate with the patient or with the health care system delay can increase the time that patients are infectious and promote the spread of tuberculosis. In this article, we have presented the factors associated with Health care system delay in a nation-wide sample of new adult patients suffering from sputum smear-positive pulmonary tuberculosis.

Although the median of health care system delay in this nation-wide study is different from the results of the hospital-based study which had been done in Iran in 1995, but in both of these studies, Health care system delay was significantly longer than patient delay (9).

Similar situation has been observed in studies conducted in Vietnam (7.1 weeks median health care system delay vs. 3.1 weeks median Patient delay) (5), Ghana (8 weeks vs. 4 weeks) (6) and Botswana (5 weeks vs. 3 weeks) (8). However the opposite condition has been seen in New York (25 days median Patient delay vs. 6 days median Health care system delay) (4) and Tanzania (15 days vs. 120 days) (7). It is clear that for reducing the Total delay in any country, efforts should be focused more on that part of delay which is longer.

52% of the patients reported visiting a health care provider within 3 weeks from the onset of symptoms. As a practical definition, a TB suspected case is the one who has cough for more than three weeks. This short patient delay could make TB more difficult to be suspected and consequently diagnosed at the first visit to a health care system and, thus, increase the health care system delay. On the other hand, with the progressive nature of pulmonary TB, it was not surprising to find an inverse association between patient delay and health care system delay. ($p<0.001$)

Nationality, which showed a significant association with Health care system delay in bivariate analysis, could not keep its significance in multivariate analysis. One of the reasons behind this could be the association of being non-Iranian with duration of Patient delay ($p=0.001$) and consequently number and severity of symptoms at the first attendance to a health clinic. On the other hand, in the presence of "Patient delay or Number of symptoms at the first visit" in a linear regression model, the significant association of nationality with the Health care system delay disappeared.

Having cough for more than 3 weeks is somehow equal to having longer Patient delay ($p<0.001$). Also a variable like being feeder of the family had shown association with this delay ($p =0.01$), and we can see that one of the proxies of Patient delay-number of symptoms at the first visit to a clinic-which even might be a more important diagnostic clue for health care providers than Patient delay has remained in the multivariate model instead of all of these variables.

If we compare the results of the multivariate analysis in this study with other researches, done in other countries, we can see that there have been similar associations between Health care system delay and "age (in Gambia and Ghana)", "attendance

in a private clinic as the first health care system (in Vietnam, Gambia, and Ghana)", "having a negative sputum smear for Acid Fast Bacilli during the course of disease and taking Chest X-ray at the first visit (in New York)" (4,5,6,12).

In studies which were performed in Gambia, Ghana, and Vietnam area has shown a significant association with Health care system delay. However, we could not find such an association in our study which could mean the similar distribution of educational programme in urban and rural area (4,5,6).

CONCLUSION

What can be suggested for reducing Health care system delay in Iran on the basis of the results of this study? First, many of health care providers (mostly doctors) should become suspicious to TB when several symptoms (especially severe ones such as haemoptysis and chest pain) appear in patients and as we know it means that patient (and / or) previous health care providers delays have been longer. This shows the necessity of training & retraining of health care providers on TB at regular intervals. Second, for patient's whose illness continues in spite of having a negative sputum smear result for AFB, the sputum smear exam should be repeated. It means that patients should be encouraged to return if symptoms persist; however, our impression is that health care providers fail to do this. Therefore, an emphasis on repetition of sputum smear for these circumstances should be done during the training / retraining courses for health care providers. Although we do not think that increased use of Chest X-ray in first visit is indicated; however, we do suggest that there are cases for more liberal utilization of Chest X-ray such as in repeat visitors with negative AFB results. Third, as in 67% of the cases, the type of first health care system which attended by patients was private clinic. As the duration of health care system delay was significantly longer among those cases who had attended private clinics as the first health care system; integration of TB re-training courses in national continuous medical education program (CME) for private physicians is a priority and necessity. Fourth, it is necessary for health care providers to think about TB in all patients who have or suspected to have chronic respiratory diseases; because if we realize the occurrence or exacerbation of pulmonary symptoms in such cases due to some background respiratory disease, we will miss some of TB cases who are contagious for the community.

The last and the most important point in early diagnosis of pulmonary TB is the necessity of emphasis on the application of sputum direct microscopy as the first effective diagnostic action for any suspected case.

There are some limitations to this study. First, this study is limited to sputum smear-positive pulmonary TB cases; therefore, the findings from this study may not be generalized to the patients with tuberculosis or even pulmonary tuberculosis in the country. Second, there may have been some recall bias from patients regarding the onset of symptoms, estimates of delays and reported activities. Third, it can be difficult to differentiate between patient and health care system delays. For example, a patient may have to wait to obtain an appointment with a health care provider. While this may be classified as a patient delay, it may be more appropriate to classify this as a Health care system delay (although the patient sought care, it was not immediately available). Conversely, a patient may leave the hospital against medical advice before tuberculosis treatment can be started.

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