Research Article

Reasons for Delay in Seeking Care for Tuberculosis, Republic of Armenia, 2006–2007

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Background. Tuberculosis (TB) is a leading cause of morbidity and mortality worldwide. In Armenia, case reports of active TB increased from 590 to 1538 between 1990 and 2003. However, the TB case detection rate in Armenia in 2007 was only 51%, indicating that many cases go undetected or that suspected cases are not referred for confirmatory diagnosis. Understanding why Armenians do not seek or delay TB medical care is important to increase detection rates, improve treatment outcomes, and reduce ongoing transmission. *Methods*. Two hundred-forty patients hospitalized between August 2006 and September 2007 at two Armenian TB reference hospitals were interviewed about symptoms, when they sought medical attention after symptom onset, outcomes of their first medical visit, and when they began treatment after diagnosis. We used logistic regression modeling to identify reasons for delay in diagnosis. *Results*. Fatigue and weight loss were significantly associated with delay in seeking medical attention [aOR = 2.47 (95%CI = 1.15, 5.29); aOR = 2.99 (95%CI = 1.46, 6.14), resp.], while having night sweats protected against delay [aOR = 0.48 (95%CI = 0.24, 0.96)]. Believing the illness to be something other than TB was also significantly associated with delay [aOR = 2.63 (95%CI = 1.13, 6.12)]. Almost 20% of the 240 TB patients were neither diagnosed at their first medical visit nor referred for further evaluation. *Conclusions*. This study showed that raising awareness of the signs and symptoms of TB among both the public and clinical communities is urgently needed.

1. Introduction

Although tuberculosis (TB) is both preventable and curable, it remains a leading infectious cause of morbidity and mortality worldwide. In 2007, the World Health Organization (WHO) estimated 9.27 million new cases of TB, with 1.3 million deaths [1]. To decrease the impact of TB, the United Nations included TB prevention and control among its eight Millennium Development Goals, with a proposal to reduce TB incidence to half the 1990' level by 2015 [2]. To measure and achieve this, the World Health Assembly (WHA) highlighted two indicators: 70% global and in-country case detection rates and successful treatment of 85% of cases [1].

Many countries, including the majority of those belonging to the former Soviet Union (FSU), have been unable to meet these targets [3]. The breakup of the Soviet Union had devastating effects on public health infrastructure and the ability to deliver care. Severe economic and political turmoil made health system reconstruction difficult, creating favorable conditions for the rise of infectious diseases such as TB.

In the Republic of Armenia—a landlocked country in the southern Caucasus with a population of approximately 3 millions—case reports of active TB increased almost three fold between 1990 and 2003, from 590 to 1538 cases [4]. Although epidemiologic data are at times discrepant, in-country experts recognized that these data likely underestimated true TB morbidity [4]. Armenia, along with most FSU countries, is one of the WHO European Region's 18 High Priority Countries for TB control [3].

In addition to high levels of TB in many countries, the WHO European Region has the highest levels of drug-resistant forms of TB in the world [3]. In 2007 in Armenia, an estimated 9.4% of new sputum-smear positive cases and 43% of previously-treated cases had multidrug resistant forms of TB [5]. In-country experts attribute such high levels of drug resistance to treatment default and failure.

Over the past decade, Armenia has made considerable progress in rebuilding its TB control program; however, it has been a slow process, made difficult by a lack of precedent (no national TB program existed in the country prior to independence), a lack of public health infrastructure, and unreliable communication systems [6].

Therefore, it is not surprising that, as of 2007, Armenia had been unable to meet the WHA TB targets. A case detection rate of 51% for new sputum-smear positive cases for that year shows that a substantial proportion of TB cases were either not detected or not referred for confirmation [5].

Many factors likely contribute to the low TB case detection rate in Armenia. Numerous countries have conducted studies [7–13] to identify factors related to diagnostic delays of TB and, in a systematic review by Storla, Yimer and Bjune of 58 such studies, the authors identified sociodemographic and economic factors as well as the amount of time it took to reach a health facility, and the type and number of healthcare providers visited as the most common determinants of delay worldwide [14].

However, studies to identify specific risk factors for the Armenian population have never been conducted. Understanding why citizens do not seek medical attention, do not pursue specialized attention following referral, or do not receive a referral for additional diagnostic services is important. Delayed diagnosis or delayed initiation of treatment increases the risk of more severe and harder-to-treat forms of TB, and also increases the risk of ongoing transmission. Therefore, we conducted this study to understand and assess the barriers to proper and timely TB diagnosis and treatment.

2. Methods

We conducted a systematic study of patients hospitalized from August 2006 until September 2007 at the Yerevan City and the Republican Dispensaries, the two reference TB hospitals in Armenia. Following focus group discussions and pilot testing to refine the survey instrument, patient interviews began in the fall of 2006 and were conducted by trained students in the public health program of the American University of Armenia. Students received training by the study designer (SO) on principles of interview ethics and interviewing processes.

Most patient interviews were conducted at the Republican Dispensary in Abovian Marz, the national TB diagnostic and treatment facility to which all suspected cases throughout the country are referred for diagnostic confirmation. In the past several years, strong financial support has been provided to Armenia by a number of international organizations, such as the German Gesellschaft für Technische Zusammenarbeit (GTZ), the Global Fund to Fight AIDS, Tuberculosis and Malaria, and the Red Cross, which has enabled both microscopic and culture examinations for each TB case to be performed at the National Reference Laboratory located at the Republican TB Dispensary. All culture-confirmed TB cases are admitted as in-patients while undergoing the initial phase of therapy. Because all confirmed TB patients in Armenia are referred to one of these dispensaries for treatment, this population represents all known TB cases in the country. Therefore, all culture-confirmed TB in-patients present at the time of the interviewer visits were eligible for inclusion in the study (the study group included both new and relapsed patients). Our systematic sample of the inpatient TB population—in which interviewers visited every hospital room to identify patients willing to participate—yielded a participation rate of approximately 80% (a total of 240 patients).

Interviewers collected demographic information and asked each patient to recall when they first began to feel ill, what symptoms they experienced, how long after symptom onset they waited to see a doctor, their reasons for delaying medical evaluation, the type of facility at which they first sought care, the initial diagnosis, if they had been referred for further evaluation, and their adherence to treatment once diagnosed with TB. In 2006, 129 of the planned 250 surveys were completed. Data collection resumed in the fall of 2007 and a total of 240 interviews were conducted.

2.1. Statistical Analysis. Descriptive statistics were calculated to assess participant socio-demographic characteristics which were then compared to the sociodemographic characteristics of the Armenian population. Frequency of symptoms that were experienced by participants prior to seeking medical care as well as reasons for delay in seeking medical care were also calculated.

Logistic regression models were used to determine which factors were most associated with a delay in seeking medical attention after symptom onset. A review of the relevant literature failed to identify a standard definition for patient delay among persons eventually diagnosed with TB. After consultations with physicians and others knowledgeable in the field of TB, we determined that for the purposes of our study, a person was classified as a "delay" if he or she experienced hemoptysis or fever for more than three weeks, or if he or she experienced cough, fatigue, night sweats, or weight loss for more than six weeks before seeking medical attention.

Crude odds ratios were calculated for the delay variable against all other variables of interest. Adjusted odds ratios were obtained using multivariate logistic regression

modeling techniques. Since we wished to select only those variables that might be important predictors of delay for inclusion in the model, a backwards elimination strategy was employed. Because the number of participants was small relative to the number of variables we wished to assess, we divided up the variables and performed two separate backwards elimination tests. The first backwards elimination model contained only sociodemographic characteristics such as gender, age, marz (region), education level, marital status, and employment status. The second model included characteristics such as the type of facility at which participants first sought care, their symptoms, if they had knowledge of prior contact with a TB patient, the year the interview was conducted, and reasons for delay.

Variables shown to be significant in the crude analysis along with variables selected using the backward elimination procedures were included in the final model and adjusted odds ratios were calculated. The final model included the following variables: fatigue, night sweats, weight loss, thinking one had something other than TB, and thinking that the cost of seeking a medical evaluation would be too expensive.

Similar techniques were used to identify risk factors for failure to receive a referral for further evaluation if the participant was not diagnosed with TB at the first medical visit. Crude odds ratios were calculated for all variables and then backward elimination analyses were conducted.

All analyses were conducted using SAS statistical software version 9.1 (SAS Institute Inc., Cary, NC, USA).

2.2. Ethics and Data Confidentiality. Ethical approval for this study was obtained from the American University of Armenia's Institutional Review Board and was carried out in accordance with Armenian data collection and confidentiality regulations. Written informed consent was obtained from all participants prior to study enrollment.

3. Results

3.1. Sociodemographic Characteristics. There were a total of 887 cases notified to the Republican Dispensary during our study period, August 2006–September 2007. Cumulatively, our study took place over approximately four months during this 14-month period, and our 240 participants represent 27.1% of these cases.

Of those who were enrolled, 80% were male, 54% were married, 82% were unemployed, 10% had less than a junior-high education, and 30% were from Yerevan (Table 1). Ages of participants ranged from 8–77 (mean: 38.1; median: 38). When we compared a number of sociodemographic characteristics of the participants to those of the population of Armenia to assess how representative TB patients may be of the general population, we found that the regional distribution of participants, overall, was similar to the regional composition of Armenia; the distributions of other sociodemographic variables such as gender, marital and employment status, age, and education level showed a number of significant differences between our population of TB patients and the Armenian population.

3.2. Health-Seeking Patterns. Of the 209 participants for which health-care seeking information was available, 179 (86%) first sought medical care in the public sector. This included polyclinics, TB cabinets (outpatient clinics located at the sub-marz level that serve primarily to detect suspected TB cases), TB dispensaries (hospitals that serve to diagnose, confirm, and treat TB patients), as well as regional, army and prison hospitals. The remaining 30 (14%) participants first sought care from the private sector, either at private, professional clinics or from "informal" clinics or neighbors.

Ninety-five (40%) participants were diagnosed with TB at their initial visit. Of those, 83 (87%) received a referral for further evaluation, and 73 (77%) of those reported that they sought the referral as instructed. Of the 139 (59%) participants who were not diagnosed at their first visit, 113 (81%) received a referral for further evaluation. Ninety (80%) reported seeking the referral when told to. We detected no significant differences between participants who reported referral compliance and participants who did not.

3.3. Symptom Characteristics. The symptoms most frequently reported by participants were fatigue (71%), cough (70%), fever (68%), night sweats (66%), and weight loss (64%). When asked why they did not visit their healthcare provider closer to the onset of symptoms, most (58%) reported they thought their illness was not serious and would go away on its own (Table 2). Thirty-four (18%) thought they had something other than TB. Of these, 10 (30%) thought they had the flu, 6 (18%) thought they had pneumonia, and 8 (24%) took antibiotics such as gentamicin, penicillin, or ceftrioxone.

3.4. Delay. Of the 240 participants, information about time from onset of symptoms to the first medical visit was available for 218 (91%) participants. Of these, 89 (41%) met the criteria for being a "delay" patient.

3.5. Factors Associated with Delay. Results of the crude and logistic regression analyses revealed no significant associations between delay and sociodemographic factors (Table 3). Symptoms significantly associated with delay were fatigue and weight loss [aOR = 2.47 (95%CI = 1.15, 5.29); aOR = 2.99 (95%CI = 1.46, 6.14)] (Table 3). Patients with night sweats were less likely to delay [aOR = 0.48 (95%CI = 0.24, 0.96)]. Patients who thought they had something other than TB were also significantly more likely to delay a visit to their physician [aOR = 2.63 (95%CI = 1.13, 6.12)].

Beginning January 1, 2007, new national TB payment policies were implemented whereby all TB diagnostic and treatment services became free to the patient, regardless of ability to pay. One hundred twenty-nine (54%) surveys were conducted prior to the policy change, while 111 were conducted after. Because we had asked questions regarding cost as a potential barrier, we included a "prepolicy change" and a "postpolicy change" factor in the analysis. However, having been enrolled into the study prior to the policy change was not statistically associated with being a delay case.

TABLE 1: Sociodemographic characteristics of tuberculosis patients, Republic of Armenia, September 2006–August 2007.

Characteristic	Armenia N*	%	Participants N	%	P-value
Gender					
Male	1,407,220	47	192	80	< .0001
Female	1,595,374	53	48	20	
Total	3,002,594		240		
Age (years)					
0–14	744,191	25	2	0.8	< .0001
15–24	547,700	18	50	20.8	.321
25–34	382,783	13	57	24.2	< .0001
35–44	470,124	16	52	22	.0185
45–54	335,168	11	49	20.8	.0002
55–64	216,937	7.2	14	5.9	.3927
≥65	305,691	10	16	6.8	.0364
Marz					
Aragatsotn	126,278	4.2	13	5.4	.4108
Ararat	252,665	8.4	30	12.5	.0548
Armavir	255,861	8.5	30	12.5	.061
Gegarkunik	215,371	7.2	13	5.4	.2173
Kotayk	241,337	8	35	14.6	.0038
Lori	253,351	8.4	15	6.3	.1806
Shirak	140,318	4.7	6	2.5	.029
Syuniq	134,061	4.5	4	1.7	.0008
Tavush	121,963	4.1	16	6.8	.0966
Vayots Dzor	53,230	1.8	3	1.3	.4941
Yerevan	1,091,235	37	73	30.4	.0368
Republic of Georgia			2	0.8	
Education	$N = 2,922,464^{\dagger}$				
None	16,203	1	1	0.4	.1409
Elementary school	226,453	13	22	9.2	.0244
Middle school	428,367	25	109	45.5	< .0001
High school	928,704	55	84	35	< .0001
University	92,712	5.5	24	10	.0201
Marital Status	$N = 2,432,968$				
Not married	643,025	26	86	35.8	.0024
Married	1,511,305	62	130	54.2	.014
Divorced, Live Separately, Widow	278,638	12	24	10	.4386
Employment Status	$N = 2,432,968^{\ddagger}$				
Employed	1,020,809	42	43	17.9	< .0001
Unemployed	1,412,159	58	197	82.1	

* National Statistical Service of the Republic of Armenia. National Census 2001, Republic of Armenia. Yerevan 2003 [15].
Significantly different at $\alpha = 0.05$.
† Data collected for Armenian population aged 7 years and older.
‡ Data collected for Armenian population aged 15 years and older.

3.6. Failure to Be Referred. Twenty-six participants, representing 19% of the participant population not diagnosed on the first visit to a healthcare facility, were not referred by their physician for further evaluation. We attempted to identify risk factors associated with this failure using the same methods that were used to identify risk factors for delay. Variables considered were participants' sociodemographic characteristics (gender, age, marz, educational level, marital and employment status), the type of facility at which they first sought care, the type of symptoms they reported, and prior contact with a TB case. However, due to small cell counts for many of these variables, we did not have sufficient power to do these analyses.

3.7. Treatment Delay. Once diagnosed, 230 (96%) participants were instructed to start medication. Of those, 226

TABLE 2: Reasons tuberculosis patients postponed seeking initial medical care after onset of symptoms, Republic of Armenia, September 2006–August 2007.

Reason*	N	%
Thought not serious, would pass on own	107	57.8%
Thought something else; used other meds to treat	34	18.4%
Could not afford to go to health facility	16	8.6%
Did not have time to go to health facility	12	6.5%
Did not know where to go for treatment	5	2.7%
Did not want to go to health facility	5	2.7%
Did not want others to know had TB	4	2.2%
Did not live near health facility	1	0.5%
Don't Know	1	0.5%
Total	185	100.00%

*Patients could list more than one reason.

(98%) said they initiated therapy when told to. Lack of knowledge as to where to get treatment was given as a reason for delay by two participants, including a man who waited one month to initiate therapy.

4. Discussion

This study indicates several risk factors for delayed action in the diagnosis of TB and also reveals some areas for further investigation.

Fatigue and weight loss were significantly associated with patient delay, indicating that they arouse a low level of concern among patients. Because unexplained weight loss, as well as chronic fatigue, can be markers for a number of potentially severe illnesses, Armenians should be encouraged to seek medical attention as soon as possible after recognition of these symptoms. The possibility that some of the participants who experienced these symptoms may have already had other conditions to which they may have attributed their weight loss and/or fatigue was not specifically addressed in this study, but should be considered if future studies of this kind are conducted in this population.

As noted by Storla, Yimer, and Bjune, definitions of delay are heterogeneous, as are the risk factors identified in studies of this type done elsewhere. Given the lack of a standard definition for delay, our cutoff of three weeks was determined somewhat arbitrarily following consultations with TB experts; it is slightly shorter than many others have used in the past [14]. Differences in our definition of delay, along with possible variations in the definitions of other variables (i.e., onset of symptoms, first contact with health services, etc.) or in the methods used, may account for some of the findings that are inconsistent with many of the studies done in other parts of the world, which identified sociodemographic and economic factors as being associated with delay. Of course, there are important cultural, social, and health-care related differences between Armenia and many of the other countries we identified, only one of which, Estonia, was part of the former Soviet Union, that may be behind these differences as well.

Over one-half (59%) of the participants were not diagnosed on their first visit to a healthcare provider, although the majority (81%) did receive a referral for further evaluation. However, the reasons why almost 20% of participants did not receive a referral remain unclear. Further study is needed in order to clarify and improve this problem. It would also be useful to know what factors pushed patients who did not receive a referral to pursue further medical evaluation. Although many of them likely did so because their symptoms did not improve or worsened, it is possible that their perseverance might be attributed to some protective factor *against* delay in seeking medical care. If so, the identification of this factor would be important to TB control efforts.

Additional information such as the average number of patient visits to a health center before a correct diagnosis is made and the level of knowledge about TB among medical staff is important to know. In the past few years, as part of an overall plan to decentralize health services and strengthen local primary care services, the Ministry of Health closed all marz- and district-level TB cabinets [16]. Local primary care physicians and laboratories became responsible for ensuring proper diagnosis of TB cases, although confirmation is still done at the national level. This presents new challenges for local physicians, who may not have much experience with TB, as well as challenges to existing primary healthcare facilities, which may not have adequate diagnostic capabilities.

Gender was not shown to be a risk factor for delay, but the male-female ratio in this study is striking. This, however, does correspond to the average male-female ratio of patients seen at the Republican Dispensary in 2007, and WHO TB case notification reports show that substantially more men are detected in Armenia [5]. Men may more often be subject to situations that place them at higher risk of TB exposure than women, such as congregate living conditions due to incarcerations or compulsory military service, and many men go to Russia—which has a very high TB burden—to find work. However, the possibility that women may systematically go undetected by TB surveillance systems should be investigated.

TABLE 3: Relationship between tuberculosis patient characteristics and delay in seeking health care, Republic of Armenia, September 2006–August 2007.

Characteristic	$N = 218$	Delayed (%)	cOR[a]	95%CI[a]	aOR[ab]	95% CI	Model[c]
Gender							1
Male	192	73 (38)	1.27	(0.64, 2.51)			
Female	48	16 (33.3)	1				
Age							1
0–24	44	17 (38.6)	1				
25–34	50	16 (32)	0.75	(0.32, 1.75)			
35–44	49	21 (42.9)	1.19	(0.52, 2.73)			
45–54	46	22 (47.8)	1.46	(0.63, 3.37)			
≥55	29	13 (44.8)	1.29	(0.5, 3.34)			
Marz							1
Aragatsotn	13	5 (2.3)	0.84	(0.25, 2.87)			
Ararat	28	12 (5.5)	1.01	(0.41, 2.49)			
Armavir	27	13 (6)	1.25	(0.5, 3.1)			
Gegarkunik, Syuniq, & Vayots Dzor*	18	7 (3.2)	0.86	(0.29, 2.51)			
Lori & Shirak*	20	5 (2.3)	0.45	(0.16, 1.29)			
Kotayk	34	15 (6.9)	1.06	(0.46, 2.48)			
Tavush	16	6 (2.8)	0.81	(0.26, 2.51)			
Yerevan	61	26 (11.9)	1				
Education							1
None/Elementary school	19	9 (4.1)	0.98	(0.29, 3.31)			
Middle school	99	35 (16.1)	0.6	(0.24, 1.49)			
High school	77	34 (15.6)	0.86	(0.34, 2.19)			
University	23	11 (5)	1				
Marital status							1
Not married	72	28 (12.8)	0.85	(0.47, 1.53)			
Married	126	54 (24.8)	1				
Divorced	14	5 (2.2)	0.74	(0.23, 2.34)			
Live separately	0	0	0	0			
Widow	6	2 (1)	0.67	(0.12, 3.77)			
Employment status							1
Unemployed	179	74 (33.9)	1.15	(0.56, 2.33)			
Employed	39	15 (6.9)	1				
Payment policy change**							1
Before	113	46 (40.7)	0.99	(0.58, 1.7)			
After	105	43 (41)	1				
Type of facility where first sought care							2
Public	166	68 (41)	0.86	(0.38, 1.97)			
Private	27	12 (44.4)	1				
Symptoms							2
Cough	164	71 (43.3)	1.53	(0.80, 2.91)			
Fever	153	66 (43.1)	1.39	(0.76, 2.52)			
Hemoptysis	41	15 (36.6)	0.8	(0.4, 1.62)			
Fatigue	160	75 (46.9)	2.77[†]	(1.41, 5.46)	2.47[†]	(1.15, 5.29)	
Night sweats	151	61 (40.4)	0.94	(0.53, 1.69)	0.48[†]	(0.24, 0.96)	

Table 3: Continued.

Characteristic	$N = 218$	Delayed (%)	cOR[a]	95%CI[a]	aOR[ab]	95% CI	Model[c]
Weight loss	150	73 (48.7)	3.08[†]	(1.62, 5.88)	2.99[†]	(1.46, 6.14)	
Headaches/Dizziness	7	2 (28.6)	0.57	(0.05, 3.59)			
Abdominal discomfort	14	9 (64.3)	2.79	(0.90, 8.63)			
Insomnia	5	3 (60)	2.22	(0.25, 26.94)			
Chest pain	12	5 (41.7)	1.04	(0.25, 3.94)			
Back pain	12	6 (50)	1.48	(0.38, 5.74)			
Leg Pain	2	1 (50)	1.46	(0.09, 23.56)			
Other symptoms	17	8 (47.1)	1.32	(0.49, 3.56)			
Known contact with a TB case							2
Yes	47	24 (51.1)	1.7	(0.89, 3.26)			
No	171	65 (38)	1				
Reasons for delayed medical evaluation							2
Thought not serious	102	41 (40.2)	0.95	(0.55, 1.64)			
Thought something else	30	17 (56.7)	2.11	(0.97, 4.59)	2.63[†]	(1.13, 6.12)	
Did not know where to go	4	3 (75)	6.02	(0.58, 298.9)			
Did not have time	10	4 (40)	0.96	(0.19, 4.21)			
Could not afford	14	10 (71.4)	3.96[†]	(1.2, 13.04)	3.13	(0.93, 10.58)	
Did not want to go	5	4 (80)	6.02	(0.58, 298.9)			
Fear of stigma	3	1 (33)	0.72	(0.01, 14.08)			

[a] Crude Odds Ratio, 95% Confidence Interval, and Adjusted Odds Ratios.
[b] Adjusted for the other variables in the logistic regression model.
[c] Backwards elimination model in which the variable was included.
* Stratification by marz produced < 5 cell counts in some cases. Where this occurred, marzes were combined with the nearest neighboring marz.
** As of January 1, 2007, all TB diagnostic and treatment services are free to the patient.
[†] Significant at $\alpha = .05$.

Similarly, although concern about the cost of medical service was not shown to be a significant predictor of delay in our analysis, the high level of unemployment among patients relative to the Armenian population should be noted (Table 1). Although it is unknown if the unemployment preceded, or was the result of, the diagnosis of TB, it is recognized as a disease of poverty, which is why the government's willingness to cover TB-related services is important. It would be worthwhile to monitor the policy's effectiveness over the longer-term to see if it has any impact on case detection rates.

There were several limitations to the study. Problems with recall are a likely source of bias. Although patients were newly admitted to the Republican Dispensary, they included both acute and chronic patients. Chronic patients were defined as those who had either relapsed or failed treatment. In general, the initial diagnosis of TB for chronic participants was more likely made further in the past than for acute patients. Therefore, their ability to recall onset of symptoms, who they went to see first, and how long they waited might be less accurate. No information was collected to determine the length of time from the participants' first presentation of symptoms to the time of the interview.

This study did not collect any information on participants' HIV status or other relevant comorbidities. HIV or other immune-suppressing conditions often produce an atypical TB presentation that can impair a patient's, or their clinician's, ability to detect TB, thus resulting in a diagnostic delay. The impact on our study, however, is believed to be negligible, as the estimated HIV/AIDS prevalence in TB patients in Armenia as of 2002 was 0.2% [17].

Lastly, as TB hospital in-patients, the participants had been detected—whether early or late—by the healthcare system. TB cases who, for whatever reason, had not yet been detected by existing surveillance methods were not represented in this study and the reasons for their lack of detection could not be assessed.

5. Recommendations

Outreach efforts to raise awareness of TB as a public health concern in Armenia and increase knowledge of its signs and symptoms are needed. Given a general lack of recognition about signs and symptoms of TB, and the fact that some patients self-treat or are prescribed with inappropriate antibiotics, information about the consequences of misusing antibiotics (i.e., drug resistance) should be widely disseminated, not only to the Armenian public, but to the medical community as well. Physicians should be aware of the importance of performing appropriate diagnostic tests prior to administering therapy.

Better local access to TB services may help to reduce patient delay due to distance factors and increase referral compliance, but continuing education of physicians at the local level such that they will be better equipped to recognize TB is also important, as many local physicians are general practitioners, not TB specialists. Physicians should have a higher index of suspicion for TB and refer patients for further evaluation more often. Ideally, improving local laboratory infrastructure and increasing the ability to diagnose locally—including allocation of liquid or solid media to do culture confirmations and resistance testing (currently done only at the National Reference Laboratory)—would make follow-up services easier to deliver and decrease diagnostic turn around time. These in turn would decrease the amount of continuing transmission in the community and lead to better patient outcomes.

The case detection rate of 51% is an estimate obtained using a WHO algorithm [1]. However, reliable estimates of the TB prevalence in Armenia are lacking. It is therefore hard to assess the true case detection rate. A population-based study to determine the prevalence of TB in Armenia should be done in order to obtain a more accurate picture of the TB problem as well as the proportion of active TB cases that are difficult to detect with current surveillance methods.

6. Conclusions

This study showed that patient and provider factors resulted in diagnostic delays of TB. Identification of where these delays occurred and why will help decision makers target interventions more effectively. We strongly encourage decision makers in Armenia to thoroughly investigate all potential causes of delay—patient, provider, and laboratory—and improve TB surveillance systems accordingly. Better surveillance data will give a more reliable picture of the burden of TB in Armenia and can be used to assess how well current diagnostic, treatment, and control activities are working as well as identify ways in which they may be improved.

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