Original Article

Knowledge and attitudes of tuberculosis management in San Juan de Lurigancho district of Lima, Peru

Elizabeth Kiefer[1], Theresa Shao[2], Olveen Carasquillo[3], Pamela Nabeta[4,5], Carlos Seas[4]

[1]Montefiore Medical Center, Bronx, NY
[2]Columbia University Medical Center, New York, NY
[3]University of Miami, Miami, FL
[4]Instituto de Medicina Tropical Alexander von Humboldt, Universidad Peruana Cayetano Heredia, Lima, Peru
[5]Foundation for Innovative New Diagnostics, Geneva-Switzerland

Abstract

Background: Expansion of the health care workforce in Peru to combat tuberculosis (TB) includes both professional health care providers (HCPs) such as doctors and nurses, and non-professional HCPs such as community health workers (CHWs). We describe the knowledge and attitudes of these HCPs, and identify modifiable barriers to appropriate anti-tuberculosis treatment.
Methodology: We surveyed HCPs practicing in 30 clinical settings (hospitals, community health centers, and health posts) in the San Juan de Lurigancho district of Eastern Lima, Peru. Multiple-choice questions were used to assess knowledge of TB. A five-item Likert scale was created to assess attitudes toward the community, patients, and clinics. Linear regression was used to identify predictors of mean knowledge score, and analysis of variance was used to test differences in HCP score.
Results: Of the 73 HCPs surveyed, 15% were professionals (doctors or nurses). The remaining 85% were health technicians, community health workers (CHWs) or students. The mean knowledge score was 10.0 ± 1.9 (maximum 14) with professional HCPs scoring higher than other HCPs (11.7 ± 1.1 vs. 9.7 ± 1.9), $p < .01$). Knowledge gaps included identification of patients at high risk for TB, assessment of treatment outcomes, and consequences of treatment failure. The most commonly cited modifiable barriers were structural, including laboratory facilities and staffing of TB clinics, with 52.1% and 62.5% of HCPs, respectively, citing these as problematic.
Conclusions: Efforts to improve knowledge of TB HCPs in Peru should focus on the specific gaps we have identified. Further research is needed to evaluate whether these knowledge gaps correlate with TB control.

Introduction

Peru was one of the first high-burden tuberculosis (TB) countries to successfully implement Directly Observed Therapy, Short-Course (DOTS), resulting in a sharp decline in TB incidence from 1991 to 1999 [1]. Despite these efforts, a resurgence of TB and multi-drug resistant TB (MDR-TB) occurred during the last years of this decline [2,3]. In response, community-based programs were implemented in conjunction with aggressive individualized treatment for MDR-TB [4-6]. Community health workers (CHWs) were employed to strengthen clinic follow-up, patient adherence, and integration of TB services with other health services. These CHWs had already proven to be successful components of MDR-TB treatment in some parts of Peru [7,8].

With the expansion of the TB health care workforce in Peru, there is increased recognition that little is known regarding the knowledge and attitudes of health care providers (HCPs), including professional HCPs such as doctors and nurses, and non-professional HCPs such as CHWs. This lack of knowledge is in contrast to an increasing body of research on patient-centered characteristics, such as education, social supports, and patient perceptions and behaviours [9-12].

We conducted a comprehensive survey of knowledge and attitudes of HCPs in a poor district in Lima, Peru. Our goal was to survey public sector HCP knowledge and also to obtain information concerning HCP's perceptions of specific areas for

improvement within the existing community-based TB care delivery system.

Materials and methods

The San Juan de Lurigancho area in eastern Lima, home to approximately one million residents, is one of the city's most populated and poorest districts. The Ministry of Health operates over 30 different health care facilities within this region, including a large central hospital, 17 community health centers (CHCs), and 12 health posts. The central hospital provides a wide range of primary care, specialty services, and diagnostic testing. CHCs provide primary care, preventative services, diagnostics, and referral to the hospital for complicated case management or inpatient services. CHCs and health posts are equipped and staffed to implement DOTs. All CHCs, but not all health posts, are able to identify possible TB cases by direct examination of sputum for acid-fast bacilli.

We surveyed 73 HCPs including 11 professional HCPs (5 doctors and 6 nurses) and 62 non-professional HCPs, including health technicians (43), CHWs (8), and students (11). Health technicians are employed by the Ministry of Health to work in the TB program office under the supervision of a nurse/medical doctor after a special government-sponsored program of study. They dispense medication, conduct follow-up visits, manage data and records, and perform counseling. CHWs are clinic volunteers without special training in the health sciences who assist in record keeping, follow-up visits, and treatment dispensing. Students included medical, nursing, and technician trainees. In the district, more than 50% of the paid HCPs are health technicians, and we sought to capture all HCPs who staffed the TB clinics within the thirty sites in the district, representative of this proportion.

We developed a Spanish-language cross-sectional TB survey based on guidelines developed by the Ministry of Health, the Estrategia Sanitaria Nacional de Prevención y Control de la Tuberculosis (ESNPC), and previously published surveys of HCPs in developing countries [13-15]. The survey consisted of 14 multiple choice questions on TB knowledge, including diagnosis (3 questions), transmission (5 questions), and treatment (6 questions). Correct answers were determined by established ESNPC guidelines. A sum total score was created with one point assigned for each correct answer.

Twenty-three statements were used to assess attitudes toward patients and health care settings, including the clinic environment, quality of staff education and resources, and attitudes toward social factors and program priorities. Participants selected one of five levels of agreement on a Likert scale. The survey was tested at the Alexander von Humboldt Instituto de Medicina Tropical in Lima on a convenient sample, and based on pilot results, further refined for content, wording, and language. Although our instrument was based on existing validated surveys and pilot testing suggested strong face validity, we did not perform formal psychometric testing of our revised instrument. The study was approved by the Mount Sinai Hospital Institutional Review Board and conducted in February 2007. Participation was voluntary and verbal informed consent was obtained. All data collection was confidential and did not include any identifying information.

We analyzed differences in mean knowledge scores between HCPs, practice types, age quartiles, TB coursework, and gender using one-way analysis of variance and two sample t-tests. As knowledge score was normally distributed, we used linear regression to identify the variables significantly associated with knowledge score. These covariates included age, gender, professional status, TB course participation, and type of health care setting. We collapsed the five-item attitude questions into dichotomous categories of agreement (strongly agree, agree) versus disagreement (neutral, disagree, strongly disagree). We used Fisher's exact test to compare agreement. Analyses were performed using SAS 9.1 (SAS Institute, Cary, NC).

Results

Table 1 provides the characteristics of the seventy-three HCPs surveyed. Most (85%) were non-professional HCPs such as health technicians, CHWs, and students. Eighty-three percent of the sample practiced at non-hospital based clinics. While 80% of respondents were female, all five doctors we surveyed were male. Two-thirds of respondents reported taking a TB education class.

Table 1. Demographic characteristics of 73 HCPs in San Juan de Lurigancho, Peru.

Characteristic	n (%)
Sex	
Male	15 (20.5)
Female	58 (79.5)
Age (years):	
< 30	25 (33.3)
31-40	14 (19.2)
41-50	23 (31.5)
> 50	11 (15.0)
Practice Location	
Hospital	12 (16.4)
Community Health Center	41 (56.2)
Health Post	20 (27.4)
Education	
Medical doctor	5 (6.8)
Nurse	6 (8.2)
Health technician	43 (58.9)
Community Health worker	8 (11.0)
Student	11 (15.1)
Participation in TB education class	
Yes	47 (67.1)
No	23 (32.9)

Provider Knowledge

As shown in Table 2, the mean knowledge score was 10.0 ± 1.9 out of total possible score of 14 (71% correct). Scores differed significantly between professional HCPs and non-professional HCPs (11.7 ± 1.1 vs. 9.7 ± 1.9, p < .01). By individual groups, mean scores ($\pm$ SD) were as follows: medical doctor, 12.4 ± 0.5; nurse, 11.2 ± 1.2; health technician, 9.9 ± 1.9; CHW, 10.1 ± 1.6; and students, 9.0 ± 1.9. There were no significant differences in score by gender, age quartile, or type of health care setting. Having attended a TB education class was not associated with improved knowledge scores; mean score was 10.1 ± 1.9 among those who took a class, versus 10.0 ± 1.9 among those who did not take a class (p = 0.86). The difference in scores between professional HCPs and non-professional HCPs remained robust even after adjusting for age, gender, practice type, and TB educational course (p < .01).

In general, knowledge of the cause of TB, contagious nature of the disease, symptoms, initial diagnosis, and treatment regimens was quite high among all HCPs; however, we identified some widespread knowledge gaps across all professional groups. Only 21.9% of those surveyed, including just under half of the doctors and nurses, correctly recognized that not all persons with TB will develop symptoms. In addition, only about a third (30.1%) of those surveyed knew that the correct way to assess treatment outcome was via sputum. Furthermore, less than half of the respondents recognized that resistant TB or its spread were consequences of inadequate or incomplete treatment. An additional knowledge gap among non-professional HPCs included knowing that those with HIV, intravenous drug use, close contacts or chronic illness were all at high risk for active TB. Nearly a third of non-professional HPCs did not identify that sputum was the correct way to diagnose tuberculosis.

Provider Attitudes

We did not find major significant differences in levels of agreement with attitude statements between professionals and non-professional HCPs, or by education level, age quartiles, or practice type. Regarding attitudes towards the community, HPCs agreed that traditional or alternative medicine made the TB situation worse (62.9%), but also understood that social and cultural factors played a part in

Table 2. Number and % of correct responses to knowledge questions: all respondents (n = 73), professionals (n = 11), non-professionals (n = 62).

Question	All respondents	Professional	Non-professional
What is the cause of TB?	66 (90.4)	11 (100)	55 (88.7)
Is TB contagious from one person to another?	71 (97.3)	11 (100)	60 (96.7)
How does TB spread?	45 (61.6)	9 (81.8)	36 (58.1)
Who has the most risk of contracting TB?	45 (61.6)	10 (90.9)	35 (56.5)
Do all people with TB infection have symptoms?	16 (21.9)	5 (45.5)	11 (17.7)
What is the most common symptom of pulmonary TB?	64 (87.7)	11 (100)	53 (85.5)
What is the most effective diagnostic test for pulmonary TB?	54 (74)	10 (90.9)	44 (71.0)
How many sputum samples are needed for diagnosis?	54 (74)	10 (90.9)	44 (71.0)
Can TB be cured?	72 (98.6)	11 (100)	61 (98.4)
How long is the treatment for a new patient with pulmonary TB?	69 (94.5)	11 (100)	58 (93.6)
How many drugs to treat pulmonary TB?	65 (89)	11 (100)	54 (87.1)
What is the correct way to take TB drugs?	56 (80.8)	10 (90.9)	49 (79.0)
What is the most important factor in assessing treatment outcome?	22 (30.1)	3 (27.3)	19 (30.7)
What could be the consequences of incomplete or inappropriate treatment?	31 (42.5)	6 (54.6)	25 (40.3)
Mean Score*	10.0±1.9	11.7±1.1	9.7±1.9

treatment barriers (67.6%). Over half of HPCs felt that there was limited community awareness and knowledge of TB and only 50% thought that community members knew about facilities available for diagnosis and treatment.

HCPs overwhelmingly agreed (98.6%) that educating patients is an important component of therapy, and further, 57.5% felt that money would be better spent educating those patients rather than on directly observed therapy. Only 44% of respondents felt that the way patients get their TB tablets should be adaptable to individual patient circumstances.

Hospital and clinic guidelines, communication between staff, TB monitoring, and the medical supply system were generally viewed favorably; however, respondents reported a lack of adequate laboratory facilities (52.1%) and lack of adequate numbers of staff members (62.5%). Nearly 60% of providers agreed that TB treatment failures in Peru were due in part to errors in the treatment given for TB.

Discussion

In our survey of public sector TB providers in Peru, we identified several knowledge gaps. These include disease presentation, assessment of response

to treatment, and consequences of inappropriate treatment.

Our knowledge findings are similar to those of surveys done elsewhere in developing countries. Hoa *et al.*, whose knowledge questions provided a framework for this study, found that rural Vietnamese providers had a mean knowledge score of 67%, similar to the overall percentage correct found here [14]. A survey of knowledge of TB diagnosis and treatment among 75 HCPs in an urban slum in Nairobi, Kenya, found, not surprisingly, that those with a diploma in medicine scored better than those with lesser degrees [16]. A study by Siddiqi *et al.* of clinical audits of TB clinics in the San Juan de Lurigancha area in Lima found similar attitudes with regard to structural barriers in that HCPs identified a lack of coordination between laboratories and clinicians when processing diagnostic samples [17].

Agreement with several attitude statements suggested areas for further inquiry. Providers agreed that knowledge of TB and available facilities was low, and some wanted more education rather than DOTS, possibly reflecting an attitude towards an increased need for TB prevention and awareness. An important ancillary study to our findings on barriers

to TB care would be to survey TB patients and compare the results.

Treatment delivery in Lima is at the clinic level, but 44% of providers felt that the way patients get their treatment should be adaptable. Although HCPs will seek out at home those who have missed therapy, they will not regularly deliver treatment at home. It is unclear whether HCPs feel that treatment should be offered at home or at the workplace, as suggested by WHO guidelines [18]. Adapting TB treatment in Peru's remote Amazon jungle and high plateau has been a success which might be applicable on a wider scale in Lima, but could be difficult in the face of perceived lack of clinic support [1].

One limitation of this study is its small sample size and cross-sectional design; thus poor knowledge of HCPs cannot be interpreted as a cause of poor TB control. Although the study lacked doctor and nurse participation, representation of health technicians and community health workers, those who perform actual day-to-day medication dispensing and follow-ups, was more robust. Lower knowledge scores among non-professional HCPs was not unexpected given their fewer years of intense training; however these non-professional HCPs have much higher daily interaction with TB patients than physicians or nurses, who may only be present once a week at the health centre. Further studies are needed to assess actual practices, such as how medications are dispensed or if masks are worn, and to assess whether poorer knowledge impacts these practices.

Another limitation was that we did not have information about the content, frequency, structure, or details of the TB training classes. Although 67% of providers reported taking a TB training class, we found that this training class did not impact knowledge scores. This may reflect our small sample size, and further investigation could provide insight about whether participants found the classes to be informative, whether knowledge level increases following this education, or whether knowledge from these classes is correlated with TB control. If the courses are a primary source of TB knowledge or continuing education for some practitioners, the quality and educational information in those courses may need to be revised.

In general, knowledge about TB diagnosis and treatment in our surveyed population was fair;

however, specific competencies in recognizing high-risk patients was identified among HCPs, suggesting areas for increased education and training in this group, as well as more rigorous processes for evaluation of such training. HCPs also expressed lack of support and differing opinions about treatment implementation, suggesting the need for increased voice and participation in TB treatment programs within this community.

Acknowledgement

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Corresponding Author

Carlos Seas, MD
Instituto de Medicina Tropical Alexander von Humboldt
Universidad Peruana Cayetano Heredia, AP 4314, Lima 100, Peru
Tel: (+51) 1 482 3910. Fax: (+51) 1 482 3404.
Email: cseas@upch.edu.pe

Conflict of Interest: No conflict of interest is declared.