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Tuberculosis diagnosis: primary health care or emergency medical services?

ABSTRACT

OBJECTIVE: To assess primary health care and emergency medical services performance for tuberculosis diagnosis.

METHODS: Cross-sectional study were conducted with 90 health professionals from primary health care and 68 from emergency medical services, in Ribeirao Preto, SP, Southeastern Brazil, in 2009. A structured questionnaire based on an instrument of tuberculosis care assessment was used. The association between health service and the variables of structure and process for tuberculosis diagnosis was assessed by Chi-square test, Fisher's exact test (both with 5% of statistical significance) and multiple correspondence analysis.

RESULTS: Primary health care was associated with the adequate provision of inputs and human resources, as well as with the sputum test request. Emergencial medical services were associated with the availability of X-ray equipment, work overload, human resources turnover, insufficient availability of health professionals, unavailability of sputum collection pots and do not request sputum test. In both services, tuberculosis diagnosis remained as a physician's responsibility.

CONCLUSIONS: Emergencial medical services presented weaknesses in its structure to identify tuberculosis suspects. Gaps on the process were identified in both primary health care and emergencial medical services. This situation highlights the need for qualification of health services that are the main gateway to health system to meet sector reforms that prioritize the timely diagnosis of tuberculosis and its control.

DESCRIPTORS: Tuberculosis. Diagnostic Services. Health Centers. Emergency Medical Services. Health Services. Health Services Evaluation.

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INTRODUCTION

Although effort has been made in Brazil with regards tuberculosis (TB), including setting up the DOTS (Directly Observed Therapy Short-Course) strategy³ and the decentralization of its activities for primary health care (PHC) services, identifying cases is one of the technical aspects which has challenged control. The country's performance in detecting cases in 2011 was 91.0%.^a However, in the state of Sao Paulo, in 2011, around 66.0% of those with respiratory symptoms were examined using the sputum smear, whereas in Ribeirao Preto, SP, Southeastern Brazil, this percentage was 16.0%.^b

Despite the availability of diagnostic materials and methods in Brazil, many areas have difficulties in timely detection of TB cases, either by not valuing coughing as a clinical symptom of the disease, not prioritizing sputum smear in diagnosis or by the lack of access to health care services and activities.^{2,8,14-16,18} This shows the need to qualify health care services, principally those that function as entry points to the health system in meeting sector reforms that prioritize opportune diagnosis of the disease as a control strategy.

Two types of health care services were considered as gateway. One of these, PHC (primary health care units and family health care units), with health care guided by generalized teams, is responsible for the health care situation in the area covered and for simultaneous intervention in acute and chronic conditions. It goes beyond curative interventions at an individual level and requires the application of knowledge from various areas of social and biological sciences.

PHC has resources of low technological density and should fulfill three main functions: problem solving (solving more than 85.0% of the population's problems). Communication (organizing flows of individuals, products and information between different levels of health care) and taking responsibility for health districts.^{12,c} PHC should be privileged as the gateway to health care services and the health care model should focus on health surveillance, composed of actions promoting health and preventing and controlling diseases and health problems,³ including TB.

The other health care service deemed to be a gateway were the emergency services (ES), which play a fundamental role in meeting sudden needs for care, as they provide care 24 hours a day and have technologically dense resources to treat acute conditions and worsening chronic conditions. A function of this service is to

identify the severity of the individual's situation in the shortest time possible and to identify the appropriate place for them to be treated, including there in the service itself.¹² ES was the preferred gateway for public health care service users in Ribeirao Preto.^{2,16}

Studies^{9,10,16,20,d} show that PHC and ES are most sought at the onset of TB symptoms. The aim, therefore, was to contribute to the production of knowledge aimed at evaluating health care services and formulating public policies leading to timely diagnosis of the disease in the health care system network.¹²

The aim of this study was to evaluate the health care service quality gateway in diagnosing tuberculosis.

METHODS

Cross-sectional study carried out in Ribeirao Preto, SP, Southeastern Brazil, in 2009, based on evaluations of health care services,^{5,21} regarding the diagnosis of TB in two types of services (PHC and ES).

The estimated population of Ribeirao Preto in 2009 was 563,107 inhabitants. The health care was regionalized and hierarchized into five health districts with 41 PHC services (28 primary health care units and 13 family health care units), five ES, 14 hospitals and five outpatients with Tuberculosis Control teams,^c deemed priority in controlling the disease.

The PHC meets programmed demand in general medicine, pediatrics and gynecology. The ES meets sudden demand, with a nursing team receiving the patient without classifying risk, before the medical appointment. Diverse medical specialties, including radiology, are also offered within the same ES physical structure in three of the five ES.

The population of the study was made up of health care professionals (doctors and nursing team) who had been working in the PHC or ES for at least three months. To calculate the sample size, the selection criterion was to use five to ten times more observations than the number of variables included in the study,⁷ considering multiple analysis. There were seventeen variables in this type of analysis, giving a sample of 170 health care professionals.

The sampling process was composed of proportional shares considering the professional category (34.1% doctors, 17.1% nurses and 48.8% nursing assistants/technicians), according to data recorded in the CNES

^a World Health Organization. Global tuberculosis report 2012. Geneva; 2012. (WHO/HTM/TB/2012.6).

^b Secretaria da Saúde do Estado de São Paulo, Centro de Vigilância Epidemiológica "Prof. Alexandre Vranjac", Divisão de Tuberculose. Sala de Situação de Tuberculose. São Paulo; 2012 [cited 2013 Oct 31]. Available from: <http://tuberculose.sp.cealag.com.br/>

^c Prefeitura Municipal de Ribeirão Preto. Plano de Gestão do Município de Ribeirão Preto. Ribeirão Preto (SP); 2009 (cited 2013 Nov 21). Available from: <http://www.ribeiraopreto.sp.gov.br/ssaude/conselho/i16relatorio-gestao-09.pdf>

^d Mamede S. Os modelos tradicionais para a educação continuada e seus resultados. Fortaleza: Instituto Inovare; 2005.

^e This is a record which aims to provide up-to-date information on actual conditions of the infrastructure of federal, estadual and municipal care units.

National Register of Health Care Facilities^e on the PHC and ES in Ribeirao Preto (373 doctors, 187 nurses and 534 nursing assistants/technicians in 2008 after removing duplicates); and convenience sampling in which the health care units were randomly selected and all health care professionals interviewed. Further selection took place if the selected health care service did not fulfill the number established for the sample.

In total, 158 health care professionals agreed to take part: 49 doctors, 28 nurses and 81 nursing assistants/technicians. Nine doctors, one nurse and two nursing assistants/technicians refused to take part.

Data collection took place between July and October 2009 using a structured questionnaire based on an instrument that evaluated TB care in Brazil.²³ The questionnaire was composed of eight questions evaluating the structure and eight evaluating the process, as well as questions on the workplace and how long the health care professionals had been working there.

In the structural component, the focus was on personnel/human resources elements (availability of health care professionals, turnover, work overload and preparation for identifying suspected TB cases) and facilities and equipment/resources (existence of forms to request sputum smear, pots to collect sputum smear, freezers for storing sputum smear and X-ray equipment).

Regarding the process (provision of care), the focus was on the element of recognizing the problem, in other words: requesting sputum smear, referral to doctor, request for chest x-rays, referral to other health care services, quality of time spent with each user, difficulty in completing requests for tests, difficulty in persuading the subject to collect sputum smear and feeling responsible for delays in diagnosing TB.

The instrument had been evaluated by experts in assessing health care services, as well as a pilot test with 15 health care professionals (five doctors, five nurses and five nursing assistants/technicians) from each type of service.

Multiple correspondence analysis was used to investigate the existence of associations between the passive (workplace – PHC or ES) and active (other variables of the study) variables.

Variables which only corresponded to specific professionals and the categories of which had the lowest eigenvalues were excluded from the multiple correspondence analysis, analyzed using Fisher's exact test (in which the expected frequencies were < 5). A level of significance of 5% was adopted. The variables were: prepare to identify TB suspect, referral of TB suspects to a doctor, requesting chest X-rays in TB suspects,

referral to other health care service and difficulties in completing the test request forms.

The project was approved by the Ethics Committee of the Nursing School in Ribeirao Preto (Process no. 0984/2008). The interviews were carried out in privacy following a consent form being signed by the interviewees.

RESULTS

Of the 158 health care professionals interviewed, 90 (57.0%) worked in PHC and had worked there for an average of 11.5 (sd = 7.5) years (maximum 32 years, minimum 0.02 years, and mean 12.5 years). A total of 68 (43.0%) health care professionals worked in ES and had, on average, worked there for 8.1 years (sd = 8.1) (maximum 30 years, minimum 0.2 years and median five years).

Factor analysis privileged dimensions 1 and 2, with eigenvalues of 0.224 and 0.189. The Figure shows the dimension to which each variable belongs, according to highest absolute contribution (Cos²). Dimension 1 was composed of variables related to financial resources (structure) and requests for sputum smear (process) and explains 12.3% of the variability of the data. The categories related to greater availability of resources to request sputum smear and better performance regarding requests for this test were on the positive side of dimension 1, and the PHC was most associated to them. The categories related to the availability of chest X-ray equipment and to worse performance on the part of health care professionals in requesting sputum smear were positioned on the negative side of dimensions 1, and the ES was most associated with them.

Dimension 2 was made up of variables related to human resources (structure) and the health care professionals' perception of their responsibility for delays in diagnosing TB (process) and explained 10.4% of data variability. The categories related to weaknesses in the availability of human resources and not feeling responsible for delays in diagnosing TB were on the positive side of dimension 2 and the ES was most associated with these categories. The opposing characteristics were on the negative side of dimension 2 and the PHC was most associated with them (Figure).

Most health care professionals in the PHC and ES reported being prepared to identify suspected cases of TB and to request sputum smear. Professionals belonging to the PHC and ES nursing team referred suspected cases to doctors, who requested chest x-rays in more than 50.0% of cases in both services. There was an association between ES and referrals of suspected cases to a health care service for further investigation by a specialized team (Table).

Table. Distribution of frequency and Chi-square/Fischer's exact tests of variables related to the preparation of health care professionals and the care process in diagnosing tuberculosis, according to gateways to services. Ribeirao Preto, SP, Southeastern Brazil, 2009.

Variable	Primary Health Care		Emergency Services		P
	Yes	No	Yes	No	
Preparation for identifying suspected TB cases	66 73.3%	24 26.7%	47 69.1%	21 30.9%	0.5610 ^a
Referral of suspected TB case to a doctor, by the nursing team	47 74.6%	16 25.4%	32 69.6%	14 30.4%	0.5608 ^a
Requesting an X-ray in suspected TB cases	16 59.3%	11 40.7%	14 63.6%	8 36.4%	0.7544 ^b
Referral of case to another health care service by the doctor	–	27 100%	6 27.3%	16 72.7%	0.0053 ^a
Difficulty in completing requests for tests	23 25.6%	67 74.4%	26 35.0%	39 65.0%	0.2193 ^a

Notes: Invalid data (not applicable) were not included in the Chi-square and Fischer's exact tests.

TB: tuberculosis

^a Chi-square test

^b Fischer's exact test

DISCUSSION

The structure of the PHC services had enough capacity to request sputum smear and to perform diagnoses of TB, considering the availability of resources (forms, pots for collecting sputum smear, freezers or thermal containers) and human resources, which reported lower turnover and work overload. EM structure had higher technological density and X-ray is the main option for diagnosing TB, suggesting that demand is often determined by the provision and availability of this service.

The municipality in question possessed structural instruments that are components in the potential for continuity and coordination of care, as well as in creating a health care network, such as: existence of an information system (Hygia-Web) to record appointments and tests performed, which means the users' treatment within the municipal health care system can be tracked; adequate laboratory support in the municipality; and a transport system enabling users to travel between units in the health care system network, permitting access to different care units.

In spite of this, the lack of structure in the network's work, as well as underuse of recording systems (both manual and computerized) and of care protocols for classifying risks in gateway services, bringing with them appointment overload in the ES and duplicating actions by different parts of the health care system.

Important weaknesses were identified in managing human resources in the ES: there were not sufficient health care professionals to deal with demand; some professionals did not view requesting sputum smear

as within their remit; some professionals were not included in courses on training/education about TB, as the municipality dedicated the majority of these courses to PHC staff.

It is essential that training strategies are drawn up for the ES which take into account the work overload and staff turnover found in this study. Simple alternatives, such as regular meetings for continuous professional development should form part of the teams' day-to-day activities.¹⁷ Time devoted to education should be valued as part of the contracted hours¹² and should go beyond traditional teaching processes, characterized by organized interventions unconnected to professional practice.¹¹

Although health care professionals in PHC reported feeling prepared to identify a suspected TB case and request sputum smear, this attitude was not transformed into practice with regards being incorporated into responsibilities. PHC managed to diagnose 15.3% of expected TB cases in 2009.^f

This situation is partly recognized by PHC health care professionals, who identified their actions as related to delays in recognizing TB. Care in PHC is mainly organized around demand programmed through appointments for priority groups in the area covered. This leads to fewer appointments to cover sudden demand and suspected cases with poorly defined respiratory complaints are referred to ES or other services.

Unsatisfactory performance by PHC may be related to poor incorporation of knowledge into day-to-day practice by the professionals. This results in identifying TB cases not being incorporated into routine work in the

^f Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica. Manual de recomendações para o controle da tuberculose no Brasil. Brasília (DF); 2011. (Série A. Normas e Manuais Técnicos).

areas covered and in poor levels of diagnosing cases, which increases the time that passes until this health problem is identified.

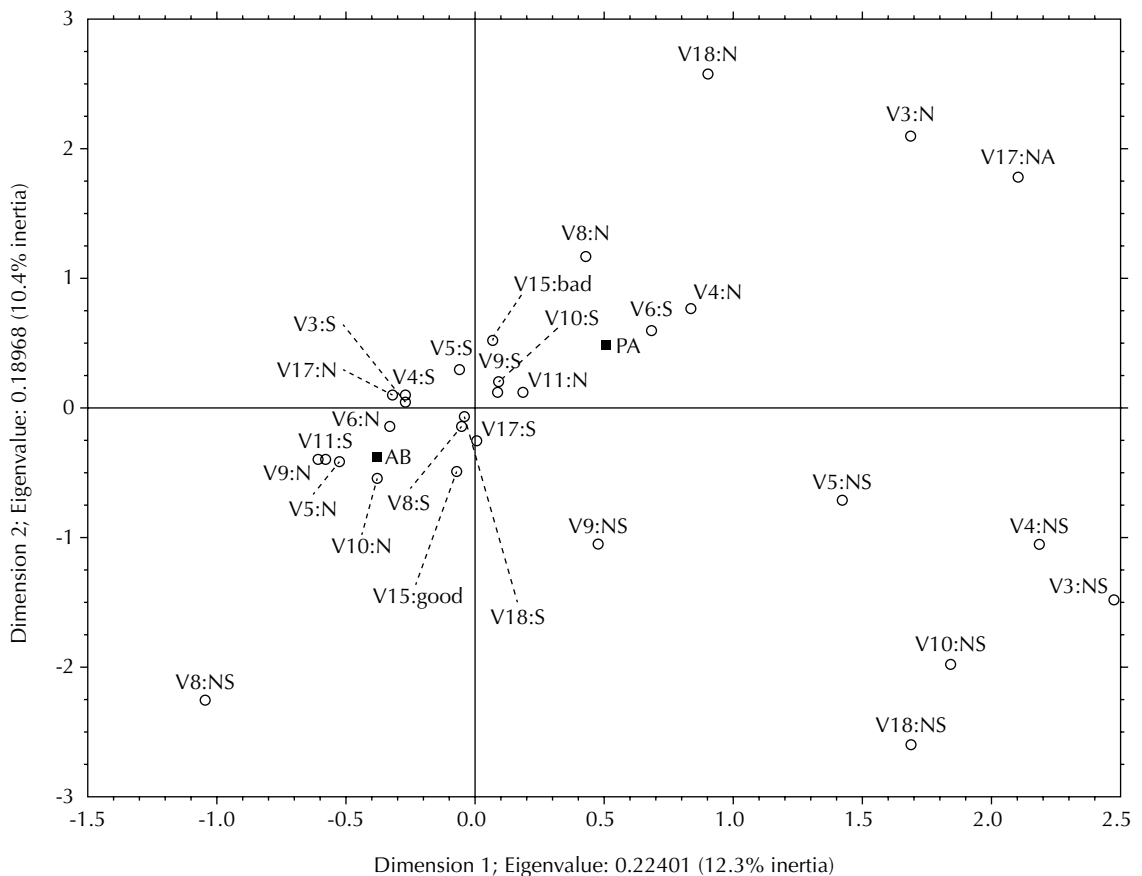
These hypothesis concerning poor PHC performance were raised in the study by Monroe,¹³ in Sao Paulo state, which mentions the incapacity of PHC health care professionals in approaching the discussion of TB, deeming it to be the remit of specialized services. Another study¹⁶ identified secondary and tertiary health care services as responsible for the majority of diagnoses in Ribeirao Preto.

Scheduling routine and other medical appointments in PHC is according to municipal managerial directives, which are not always compatible with the needs of the population's needs. This produces high demand in ES, which has greater flexibility in scheduling and guaranteeing appointments.

Many TB sufferers may pass through ES, given the large number of appointments in these services in 2009. However, the number of TB cases diagnosed by the ES corresponded to 8.2% of what was expected.^f This service needs to be prepared to recognize suspected cases, being more prepared to listen to and identify complaints, as well as providing the first sputum smear test.

The work overload identified in the ES means the care process does not solve problems, especially with regards to treating chronic conditions, such as TB, due to poor implementation of health care policies, related to the order of service users' access to the care network and to poor problem solving and poor quality service in PHC, along with difficulties in changing cultural habits and the population's beliefs. Thus, developing strategies to evaluate risk in ES units, referring low risk patients to PHC would facilitate their acting as gateways to the health care system and would relieve ES. As long as they remain uncoordinated from the PHC network, the two types of units will remain in competition, undermining the PHC with regards being used for regular care.⁶

According to Almeida et al¹ (2010), none of the levels of the health care system have enough resources to completely meet the population's health care needs. It is essential that referral and counter-referral mechanisms are strengthened, as well as health care services becoming integrated and cooperative. Working as part of a network is one of the components for providing comprehensive, continuous, problem solving care and differs from the dominant focused and selective conception that predominates poor quality actions and services directed at poor and vulnerable populations.



Legend	Response category	Cos ²		Dimension
		Dimension 1	Dimension 2	
V3 – form for requesting sputum smear	Yes (Y)	0.610148	0.021531	1
	No (N)	0.092821	0.144469	
	Don't know (DK)	0.507429	0.178754	
V4 – pot for collecting sputum smear samples	Yes (Y)	0.494425	0.050872	1
	No (N)	0.023054	0.019137	
	Don't know (DK)	0.499758	0.114556	
V5 – Freezer for storing sputum smear samples	Yes (Y)	0.006341	0.153696	1
	No (N)	0.092730	0.058175	
	Don't know (DK)	0.276177	0.067904	
V6 – X-ray equipment	Yes (Y)	0.169958	0.128245	1
	No (N)	0.271370	0.052590	
	Don't know (DK)	0.150717	0.160657	
V8 – sufficient availability of health professionals	Yes (Y)	0.016533	0.134343	2
	No (N)	0.023191	0.176860	
	Don't know (DK)	0.006846	0.032971	
V9 – turnover of human resources	Yes (Y)	0.034240	0.066630	2
	No (N)	0.063228	0.029321	
	Don't know (DK)	0.009151	0.043832	
V10 – work overload	Yes (Y)	0.025977	0.130129	2
	No (N)	0.047377	0.095745	
	Don't know (DK)	0.043975	0.049270	
V11 – request sputum smear for suspected TB cases	Yes (Y)	0.111005	0.048444	1
	No (N)	0.111005	0.048444	
V15 – quality of time dedicated to each user	Good	0.005309	0.256637	2
	Poor	0.005309	0.256637	
V17 – difficulty in convincing suspected case to collect sputum smear	Yes (Y)	0.000091	0.078571	1
	No (N)	0.065252	0.006090	
	Not applicable (NA)	0.267978	0.191132	
V18 – feeling responsible for delays in diagnosing TB	Yes (Y)	0.042175	0.116586	2
	No (N)	0.026569	0.218034	
	Don't know (DK)	0.018268	0.043174	

Passive Variable (type of health care service): PHC: Primary Health Care; ES: Emergency Services; TB: tuberculosis

Figure. Factor plan of evaluation of gateway services in diagnosing tuberculosis. Ribeirao Preto, SP, Southeastern Brazil, 2009.

This way of working means recognizing that health care needs should guide the financing and resources that are essential to the system's good performance if the goal of improving the population's living and health conditions is to be met.²² Every location which provides health care is relevant and had to negotiate between common missions/objectives and attributes specific to the components that make up the health care network: PHC, secondary and tertiary care and support and logistic systems.

In addition to the aspects specific to the provision of care in PHC and ES, similarities were found in the care provided. Manuals for controlling TB recommend that cases are recognized through active searches and

requesting/guiding collection of sputum smear. However, in few services was it verified that the nursing team were responsible for these activities, with diagnosis being centered on the figure of the doctor and on the use of more technologically dense resources (X-ray).

Controlling TB requires guaranteed access to health care services and the availability of trained human resources. Their work process includes incorporating knowledge into the organization and provision of care from suspecting a case to its clinical management.

For care to be produced, abilities are required in integrating clinical and epidemiological knowledge and go

beyond the challenges faced by the municipal health care system, namely: strengthening PHC in its role as gateway to the health care system and its performance as the communication center of the health care network, monitoring TB cases and integrating services which are normally offered in a fragmented way.

Advances need to be made in commitment in order to guarantee the effective consolidation of PHC in response to the crisis in modern health care systems.¹² For this to take place, Family Health Care Strategy coverage, which remained at around 12.0% under the last three municipal administrations, needs to be expanded,⁸ and new meaning needs to be given to ES units, established due to strong electoral support, given the apparent improvements in health care waiting times.⁶ All of this means that policies which compete between themselves need to be overcome in order for PHC to be strengthened and expanded, through constituting health care networks and constructing new ES units.

Health care team members need to assimilate innovative and restructuring practices into health care activities, returning to a wider view of the health-disease process and of relationships between team members^{4,19} and between health care services themselves. All of this constituting interdisciplinary work within the network.

Incorporating mechanisms that encourage managing all health care network components through clinical directives would produce an excess of cooperation between

those involved. This would help enable all locations in which care is provided explore their potential to act according to the available technological density and complexity of cases, which would increase the efficiency and effectiveness of services in diagnosing TB.

Evaluating ES and PHC performance in diagnosing TB enabled different aspects of Ribeirão Preto health care system to be evaluated, highlighting the need for interdisciplinary work within the network.

Analyzing the process only involved the aspect of care provided, with a gap remaining in evaluating care received (user perception), and this was a limitation of this study.

To conclude, ES showed structural weaknesses in identifying TB cases. Moreover, weaknesses related to processes, in both PHC and ES mean recovering a broader vision of the health-disease process and of relationships between team members and between the health care services themselves, which requires incorporating management mechanisms of components of the health care network so that all locations which provide care can explore their potential in diagnosing TB according to the technological density available and the complexity of the cases.

The qualification of health care services which act as gateways to the system is necessary in order to meet sector reforms which prioritize disease control.

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HIGHLIGHTS

This study focused on micropolicies for controlling tuberculosis, as it aimed to assess diagnosis of tuberculosis in gateway health care services in Ribeirao Preto, SP, Southeastern Brazil.

Association between primary health care services and adequate revision of inputs and human resources was found, as well as higher levels of requesting sputum tests. Emergency medical services were shown to be associated with higher levels of requesting x-rays and referring the suspected case to other services. In both services, diagnosis was centered on the doctor. Thus, primary health care services and emergency medical services have adequate structure for identifying suspected cases of tuberculosis, however, their performance depends on different forms of organization.

If primary health care is strengthened in its role of gateway to health care services and as coordinating centers for the care network, it can monitor tuberculosis cases and integrate services that today are only provided in a fragmented way, resulting in controlling tuberculosis with greater efficiency and effectiveness.

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