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MORTALITY FROM TUBERCULOSIS IN THE COUNTRYSIDE OF SÃO PAULO - BRAZIL (2006-2008)

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ABSTRACT
This is an epidemiological and descriptive study aiming to characterize the epidemiological profile of deaths due to tuberculosis in the period from 2006 to 2008 of the Regional Health Department III of the State of São Paulo, Brazil. The population was selected through reports of tuberculosis cases recorded in the Tuberculosis Patient Control Registers and death certificates with underlying cause of tuberculosis of the residents of the region covered, registered in the Mortality Information System Department. It was observed 640 reported cases in the Tuberculosis System and 34 deaths in the Information System of Mortality. It was possible to identify 22 deaths when both databases were crossed each other. Thus, there were a total of 45 deaths due to tuberculosis, which occurred mostly in male, with a mean age of 30-59 years and the pulmonary form of the disease. Forty-five percent (45%) of the reported cases occurred outside the primary health care, and the mean interval between notification and death indicated a delayed diagnosis in 77% of the cases. In conclusion, the results showed the importance of data entry reviewing in both information systems, beyond of studies to analyze strategies considered for disease control and also to measure the performance of the primary health care in this context.

Keywords: Tuberculosis. Mortality and Information Systems.

INTRODUCTION

An estimated nine million people developed tuberculosis (TB) in the world in 2013. Of these cases, 5.7 million were new and 0.4 million were already under treatment. Of the total number of this estimate, only 64% of cases have been reported[1]. Recently published data place Brazil in the 15th position in number of cases, with an incidence rate of 46 cases, including HIV patients, and a mortality rate of 2.2 deaths per 100,000 inhabitants[1].

Death from TB is an event that is on the list of causes of preventable death, that is, if appropriate actions aimed to promote, protect and recover the health of individuals and families were put in place by local health systems, this event would not occur[2]. Therefore, deaths due to TB are unjustifiable, since the diagnostic methods are relatively simple and have low diagnostic density, such as sputum smear microscopy, besides the fact that the treatment made available by the UHS is free and has 99.9% efficacy[3].

In addition, mortality studies are of great importance for monitoring and showing the damage extent of certain diseases or conditions. The outcome of death from TB, for example, can be used as a parameter to assess the severity of the endemic, the delay in the detection of cases, the delay in seeking treatment and its effectiveness[4]. Besides contributing to the detection of failures of the social network and the health system it also enables the discovery of social conditions that expose families and the community to the disease[4].

In this context, the Mortality Information System (MIS) is an important ally in the rescue of severe cases of TB, since it is considered as one of the ten leading causes of death worldwide[5].

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The identification cases of death due to TB underreporting in the Information System for Notifiable Diseases (SINAN) evidences that these patients were diagnosed only in advanced disease, due to the quality and accessibility to health services that, in turn, influence in the chain of TB transmission[2]. Failure to notify of a grievance in the surveillance system or its realization outside the period established set out misleading estimates that affect the planning of prevention strategies, which may cause under allocation of actions and resources[6].

In this sense, this research is justified by the conjunction of cases of death from TB with the mapping of network services, highlighting the weaknesses of these health systems. Thus, we proposed to characterize the epidemiology of TB deaths from 2006 to 2008 recorded in the Regional Health Department III of São Paulo - Brazil.

MATERIALS AND METHODS

It is a retrospective, exploratory and descriptive study developed at the Regional Health Department III (RHD III) of São Paulo from 2006 to 2008. It included 24 municipalities, totaling a population of 931,533 inhabitants. Of these, 281,076 were resident inhabitants of the central region, which includes the municipalities of Américo Brasiliense, Araraquara, Boa Esperança, Esperança do Sul, Gavião Peixoto, Motuca, Rincão, St. Lucia and Trabijú; 132,757 inhabitants of the Midwest region, consisting of the cities Borborema, Ibitinga, Itápolis, Nova Europa and Tabatinga; 365,424 inhabitants of the heart region, which corresponds to Descalvado Dourado, Ibaté, Porto Ferreira, Ribeirão Bonito and São Carlos; lastly, 152 276 inhabitants in the northern region, represented by the municipalities of Candido Rodrigues, Dobrada, Matão, Santa Ernestina and Taquaritinga[7].

With regard to primary health care, the Central Region has a population covered by the primary health care of 228 428 inhabitants; Midwest, 73,148 inhabitants; Heart, 232 929 inhabitants and northern 113,749 inhabitants[7].

In Brazil, TB data are available in two main systems: the SINAN and in case of death, the MIS[8]. However, the state of São Paulo in particular counts on the Notification and Monitoring System for Tuberculosis Cases - TBWeb working effectively across the state from 2006, which enabled notifications and data movements via internet[9].

Therefore, the study population consisted of all TB notifications in TBWeb and death certificates with underlying cause of TB in the MIS of the residents of the RHD III region of São Paulo in the 2006-2008 period.

For data collection, the project was approved by the Ethics Committee in Research Involving Human Subjects of the Paulista Central University Center of São Carlos - UNICEP (Protocol 90/2009).

The collection was done in the Epidemiological Surveillance Division located in RHD III in June 2008. For the TBWeb, the selection of cases was made digitally, that is, the system itself selects the total number of patients and information necessary for the search through commands. For the MIS, which is an online system, the collection started by selecting the cities that are part of RHD III, followed by the period and the International Classification of Diseases code, 10th revision (ICD – 10), which ranges from A15.0 to A19.9, including all TB forms. After this stage the system generated the number of the Death Certificates (DC); these certificates were viewed one at a time and all relevant information was recorded manually. After the collection in both systems, two independent banks were prepared in Excel.

For the selection of variables, we emphasize that the justification presented were the items that could represent the epidemiological profile of both TB deaths recorded in TBWeb, and deaths with underlying cause for TB from MIS. The information was selected according to the incoming official documents of each system: for the TBWeb, the Individual Form of Compulsory Notification for TB; for the MIS, the DC. Thus, only some variables coincided in both banks, such as the initials of the patient's name, age, the initials of the mother's name and the clinical form of the disease. As a complement, education and occupation were also selected in TBWeb; On the other hand, the location where the death occurred was selected in MIS.

For data analysis, we used the software Statistical Package for Social Sciences (SPSS)

which featured descriptive statistics for constructing tables and expressing absolute and relative frequency measures. For the data confrontation, we compared the proof and counterproof of similar data, using the initials of the patient's name, date of birth and initials of the patient's mother's name as a reference.

RESULTS AND DISCUSSION

During the study period, 640 cases of TB reported in the RHD III region, whose closure was made with 484 cases of healing (75.6%), 64 cases of abandonment (10%), 42 deaths unrelated to TB (6.6%), 23 diagnostic changes (3.6%), 22 TB deaths (3.4%), 04 transfers to another state (0.6%) and 1 blank (0.2%) were reported in TBWeb.

These indices have shown that even when dealing with a region with socioeconomic development above the state average[7], TB rates in the RHD III coverage area are similar to the Brazilian average, which also has a low cure rate (74 %) accompanied by a high dropout rate (8.8%)[10].

Among the 22 deaths that were part of the research, we observed in Table 1 that two special cases occurred in women under the age of 15, which indicates the occurrence of TB death in children or adolescents. In addition, the table also shows that 18% of the information related to education and occupation of the subjects was ignored.

Table 1: Distribution of TB deaths in RHD III according to gender, age, education and occupation from 2006 to 2008. Araraquara, 2010.

Variables	**Gender**		**Total**
Age	**Male**	**Female**	
< 15	0	2	2
15 – 29	2	1	3
30 – 59	8	0	8
≥ 60	8	1	9
Education	**Male**	**Female**	
None	1	1	2
From 1 to 3 years	0	1	1
From 4 to 7 years	9	1	10
From 8 to 11 years	2	0	2
Blanc/Ignored	6	1	7
Ocupation	**Male**	**Female**	
Retired	4	0	4
Unemployed	4	0	4
Housewife	0	1	1
Ignored	3	1	4
Not specified	7	2	9

Source: TBWeb RHD III, 2009.

Also according to the table, the higher incidence of deaths was in males - similar to that found in the literature, since this may be related to access to health services and the incidence patterns that indicate similarity between the genders up to 24 years of age and an incidence twice as high for males compared to females after 25 years of age[10].

Regarding the age group, we observed a higher number of deaths in adults between 30 and 59 years of age, suggesting exogenous transmission, where there is a new exposure to more virulent bacilli that resist to a strong immune response triggered by the host, raising the risk infection[4]. The second age group in number of deaths was in individuals who were 60 years old or older, which may be related to the general aging of the population and, therefore, shows a reduction of BCG vaccination efficacy[11].

As to the variable education, 45% of patients had four to seven years of study. Similar data is found in the scientific literature, which links the school to the evolution of death due to the lower degree of perception in terms of the disease, in addition to being one of the main factors involved in non-adherence to treatment[4].

Another socioeconomic aspect that deserves attention is the large number of cases classified as "unemployed" or "retired". For some authors, most TB patients develop activities in the informal economy[12].

We highlight the poor quality of information on occupation and education available in information systems. This lack of precision may health diagnoses and interventions that are distanced from reality. It is known that the completion of the data collection instruments, such as the Individual Compulsory Notification Form for TB, which should be filled out by health professionals, is not always understood as an important tool in their work process but as bureaucratic activity[12,13].

In addition, the lack of information in the notification forms can directly influence the underreporting of data and result in a misdiagnosis of the health situation, with interventions apart from the real need of the population, mainly affecting the quality of the care provided[13].

However, studies[12,13] report that more and more nursing has been incorporating TB control actions in its routine, which has in fact favored the improvement of the quality of care, as well as the data entry that is essential for the planning of health actions.

In addition, one should also consider the need for continued training as an important tool for understanding the indicators and fulfillment of these documents, and discussions about the team work process, specially the production of data, favoring the improvement of information.

With regard to the site of disease diagnosis, 45% of TB cases were reported in the Emergency service, 40% by means of outpatient care demand, 10% by diagnostic definition and 5% did not present information. Although the gateway to the TB care network has the primary health care as a reference, in medium and large urban centers this has often been the Emergency service. It can be inferred that the proportion of TB cases reported and treated in hospitals is higher than the expected in several regions of the country[14].

Patients in hospitals have reported more frequently delayed diagnosis, co-infection of TB/HIV and other immunosuppressive aggravations, thus rising mortality rates three or four times more than in patients in the primary care[14].

Concerning the clinical form, 95% corresponded to pulmonary TB, which is known to be the most common form of the disease[14] and which perpetuates its transmission[4,12]. The other 5% were pleural TB, which is also often associated with pulmonary TB.

In the identification of comorbidities, 45% of the cases were associated with alcoholism, 14% with TB/HIV and 23% showed the test result for HIV serology as "in progress" even after a long post-closure period case.

This result is similar to a study conducted in São Paulo, which showed as conditions associated with the evolution to death of TB patients who were not co-infected with HIV, the fact that they were over 50 years of age, alcohol addicted and unemployed[15]. Moreover, the prevalence of comorbidities among the cases demonstrates the need for a detailed monitoring by the multidisciplinary team, aiming to avoid the interruption of treatment and also the possibility of aggravation of the disease[16].

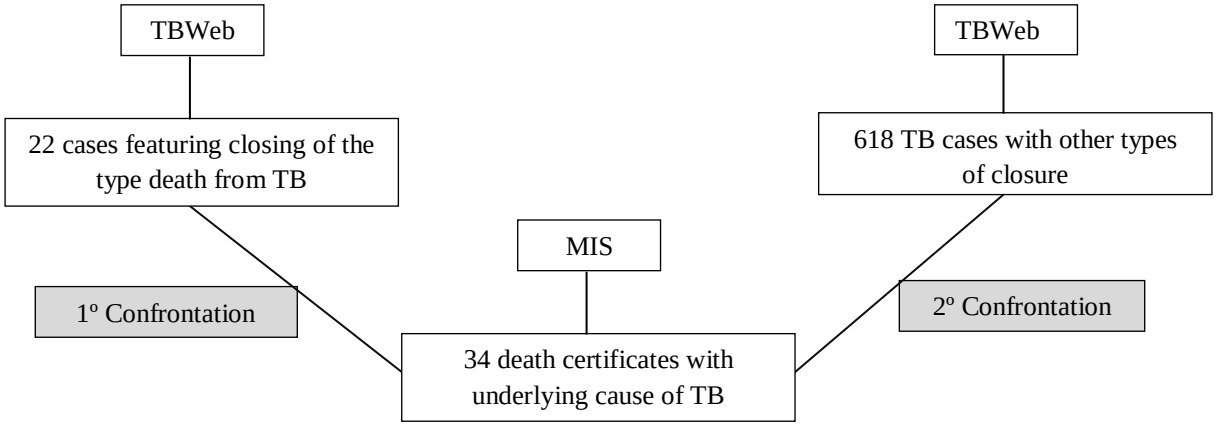
Among the MIS data we identified 34 DCs presenting the ICD from A15.0 to A19.9 as underlying causes. The male gender again proved to be prevalent, with 74% of the records. The most common age group was 30-59 years involving 18 cases (53%), followed by the age group of 60 years or more, with 11 cases (32%). Concerning the death place, 31 (91%) occurred in the hospital environment, two (6%) at home and one (3%) in a non-hospital health facility. As to the clinical form of TB, 94% of the cases were pulmonary (ICD A16.2, A16.9, A15.3, A15.0), 3% pleural tuberculosis (A16.5) and the remaining 3% were not specified in the nervous system (A17.9).

After the identification of the data in both systems, we started the confrontation procedures of data between banks. The figure below shows the flowchart of the steps taken.

In the first confrontation only 11 cases with matching records on both banks were identified and 11 cases notified as death by TB in TBWeb and which were not included on the MIS.

However, in the second confrontation, 11 more coinciding cases were found in both banks, but they appeared on the MIS as death from TB and in the TBWeb as another type of closure, of which nine appeared as non-TB death, one as healing and one as change in diagnosis. According to these procedures, the number of RHD III death coverage area in the period from 2006 to 2008 amounted to 45

cases (22 cases coinciding in both banks, 11 with closure type of death due to TB in TBWeb and 12 DCs with basic cause of TB recorded in the MIS).



Picture 1. Flow chart of the confrontation of the Notification data and Monitoring System for Tuberculosis Cases (TBWeb) with the Mortality Information System (MIS). Araraquara, 2010.

Death from TB may be a rare event; however the association of this event with socioeconomic factors and deficiencies in health services favor its rise. Overall, TB control and the conditions related to the reduction of morbidity and mortality of this disease are primarily linked to early diagnosis and treatment[15].

In the study performed with data from all over Brazil, it was found that of the 547,589 notifications of SINAN and 6,924 of the MIS data, 39.4% were not found in SINAN from in the period from 2001 to 2006. Among the proportion of underreported deaths by region and federal units, the highest percentage was in the North, followed by the Southeast and Northeast. The addition of the deaths that were unrelated to the SINAN database raises new case notification rate at 3.7%. Failure to observe these data contribute to a false sense of reduction of TB cases and their severity when they are analyzed by only a single information system[8].

Of the 22 coinciding reported cases in both systems, we performed the calculation of days between the notification date and the DC. In five cases, it was observed that first death occurred, and therefore, the notification was made; in other five cases, the deaths occurred within 15 days after the date of notification and seven patients died after 45 days in TBWeb (Table 2).

Table 2. Interval between the notification date of the TB Patient Control System (TBWeb) and TB deaths according to the Mortality Information System (MIS) of the RHD III from 2006 to 2008. Araraquara 2010.

Interval of days	Notification to death (+) TBWeb → MIS	Death to notification (-) MIS →TBWeb
0 – 15	5	2
16 – 45	7	2
46 – 75	1	1
76 – 95	1	0
96 – 125	0	0
156 – 185	1	0
186 and +	2	0
Total	17	5

Source: MIS e TBWeb RHD III, 2009.

The lack of notification on the TBWeb (cases of individuals who died and were subsequently reported) evidences that these patients did not have access to treatment for TB, as there is a requirement that patients are registered in TBWeb to start treatment in the state of São Paulo. These data demonstrate the need for redimensioning the infrastructure for the diagnosis and systematic search of TB cases among patients with respiratory symptoms. A similar situation occurred in the study conducted in São Paulo, in which 416 deaths due to TB were identified as the underlying cause: of these, 30.4% had a diagnosis made after death and 49.5% were not reported[17].

The high proportion of cases diagnosed after death or untreated demonstrates the difficulties of health services to identify and timely treat a significant portion of the TB cases. These characteristics make them potentially preventable

and should be a priority in public health interventions[17].

There was a hypothesis that the fact that there is a number of health facilities in the studied region which is higher than the state average, death should then be a rare occurrence. A study conducted in a micro region of RHD III shows that TB care on site also features a flow of centralized service, which can hamper the movement of patients and information relating to TB[12,18].

CONCLUSION

The characterization of death due to TB in the RHD III enabled the identification of the occurrence of TB deaths at the extremes of age, as well as data inconsistency by filling failure and lack of information. Thus, it was evident the need to qualify the information available in the information systems through periodic intercommunication between the different systems for possible errors, in addition to conducting studies in the region to examine the strategies used in the disease control measures as well as the role of primary care in this context.

MORTALIDADE POR TUBERCULOSE NO INTERIOR DE SÃO PAULO – BRASIL (2006-2008)

RESUMO

Estudo epidemiológico, descritivo, com objetivo de caracterizar o perfil epidemiológico dos óbitos por tuberculose no período de 2006 a 2008 do Departamento Regional de Saúde III do Estado de São Paulo – Brasil. A população foi constituída pelas notificações de casos de tuberculose registradas no Sistema de Controle de Pacientes com Tuberculose e de declarações de óbito com causa básica de tuberculose registradas no Sistema de Informação sobre Mortalidade, de residentes da região de abrangência do Departamento. Foram notificados no Sistema de Tuberculose 640 casos e no Sistema de Informação sobre Mortalidade 34 óbitos. Confrontando-se os dados foram identificados 22 óbitos coincidentes em ambos os bancos, perfazendo, portanto, um total de 45 óbitos por tuberculose, que ocorreram principalmente em homens, na faixa etária de 30-59 anos e com a forma pulmonar da doença, 45% das notificações ocorreram fora da atenção primária e o intervalo médio entre a notificação e o óbito indicou diagnóstico tardio da doença em 77% dos casos. Conclui-se que a região necessita de uma revisão na inserção de dados em ambos os sistemas de informações, além de estudos que analise as estratégias utilizadas nas ações de controle da doença e da atuação da atenção primária neste contexto.

Palavras-chave: Tuberculose. Mortalidade e Sistemas de Informação.

MORTALIDAD POR TUBERCULOSIS EN EL INTERIOR DE SÃO PAULO – BRASIL (2006-2008)

RESUMEN

Estudio epidemiológico y descriptivo con el objetivo de caracterizar el perfil epidemiológico de los óbitos por tuberculosis, en el período del 2006 al 2008, en el Departamento Regional de Salud III del Estado de São Paulo – Brasil. La población fue constituida por las notificaciones de casos de tuberculosis, registradas en el Sistema de Control de Pacientes con Tuberculosis y de declaraciones de óbitos con causa básica de tuberculosis, registradas en el Sistema de Información sobre la Mortalidad de los residentes de la región del Departamento. Fueron notificados 640 casos en el Sistema de Tuberculosis y 34 óbitos en el Sistema de Información sobre Mortalidad. Al confrontar los datos fueron identificados 22 óbitos coincidentes en ambos bancos de datos, llegándose, por lo tanto, a un total de 45 óbitos por tuberculosis, que ocurrieron principalmente en hombres, con edades entre 30 y 59 años, y con la forma pulmonar de la enfermedad. Cuarenta y cinco por ciento de las notificaciones ocurrieron fuera de la atención primaria, y el intervalo promedio entre la notificación y el óbito indicó un diagnóstico tardío de la enfermedad en 77% de los casos. Se concluye que la región necesita de una revisión en la inclusión de datos en ambos sistemas de informaciones, además de estudios que analicen las estrategias utilizadas en las acciones de control de la enfermedad y de la actuación de la atención primaria, en este contexto.

Palabras clave: Tuberculosis. Mortalidad y Sistemas de Información.

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