

THE TUBERCULOSIS CONTROL PROGRAM IN PELOTAS/RS, BRAZIL: HOME CONTACT INVESTIGATIONS

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ABSTRACT

The aim of this study is to evaluate the investigation actions of home contacts of tuberculosis (TB) index cases in the Tuberculosis Control Program (TCP) of Pelotas/RS – Brazil. This cross-sectional descriptive study was based on data from the records of index cases. The sample consisted of 163 contacts of 68 subjects with pulmonary TB in treatment in the TCP between June and August, 2009. These contacts were predominantly female, over 10 years of age and the daughters of index cases. The requested examination was a chest radiography and bacilloscopy. Active TB was found in 1.8 % of contacts. Results show that assistance for TB patients in Pelotas-Brazil, which is centralized in a single specialized service, hinders the investigation of home contacts. Primary care is required to narrow the gap between professionals and the family, and facilitate early diagnosis and interruption of the TB transmission chain in a timely manner.

Descriptors: Contact tracing. Tuberculosis. Health services evaluation.

RESUMO

Objetivou-se avaliar as ações de investigação dos contatos intradomiciliares dos casos índices de tuberculose (TB) no Programa de Controle da Tuberculose (PCT), de Pelotas/RS - Brasil. Trata-se de um estudo descritivo de corte transversal, com dados do prontuário dos casos índices. A amostra foi constituída por 163 contatos de 68 indivíduos com TB pulmonar em tratamento no PCT, entre junho e agosto de 2009. Os contatos eram, predominantemente, do sexo feminino, com idade acima dos 10 anos e filhos dos casos índices. Os exames solicitados foram a radiografia de tórax e a baciloscopia. Verificou-se a presença da doença ativa em 1,8% dos contatos. Os resultados evidenciam que a atenção à TB, em Pelotas/RS - Brasil, centralizada em um único serviço especializado, dificulta a investigação dos contatos intradomiciliares, necessitando envolver a atenção primária, para aproximar os profissionais da família e facilitar o diagnóstico precoce e a interrupção da cadeia de transmissão da TB em tempo oportuno.

Descritores: Busca de comunicante. Tuberculose. Avaliação de serviços de saúde.

Título: O programa de controle da tuberculose em Pelotas/RS, Brasil: investigação de contatos intradomiciliares.

RESUMEN

El objetivo fue evaluar las acciones de investigación de los contactos intradomiciliares de casos índices de tuberculosis (TB), en el Programa de Control de Tuberculosis (PCT) de Pelotas/RS - Brasil. Se trata de un estudio descriptivo de corte transversal, con datos del prontuario de los casos índices. La muestra fue constituída por 163 contactos de 68 sujetos con TB pulmonar en tratamiento en el PCT, entre julio y agosto de 2009. Los contactos eran predominantemente del sexo femenino, con edad superior a los 10 años e hijos del caso índice. Los exámenes solicitados fueron Rayos X del tórax y baciloscopia. Se verificó la presencia de la enfermedad activa en un 1,8% de los contactos. Los resultados evidencian que la atención a TB en Pelotas-Brasil, centralizada en un único servicio especializado, dificulta la investigación de los contactos intradomiciliares, necesitando abarcar la atención primaria, para aproximar a los profesionales de la familia y facilitar el diagnóstico precoz y la interrupción de la cadena de transmisión de la TB en tiempo oportuno.

Descriptores: Trazado de contacto. Tuberculosis. Evaluación de servicios de salud.

Título: El programa de control de la tuberculosis de Pelotas/RS, Brasil: investigación de contactos intradomiciliares.

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INTRODUCTION

The global incidence of TB estimated for 2009 was 9.4 million cases and estimated mortality for the same year was 1.7 million⁽¹⁾. The highest number of cases (81%) was found in 22 countries considered priorities by the World Health Organization (WHO), and Brazil ranks 19th in this list. In 2010, 71,000 new cases of TB were notified with an incidence of 37.9 cases per/100,000 inhabitants⁽²⁾.

In the state of Rio Grande do Sul (RS), the incidence of this disease in 2011 was 46.1 cases per 100,000 inhabitants, which is 5th position of the national states ranking⁽³⁾. In RS there are 15 municipalities considered priorities for TB control, including Pelotas-Brazil, which, in 2008, reached the incidence rate of 46.6 cases per 100,000 inhabitants, with 23.9 smear-positive cases per 100,000 inhabitants⁽⁴⁾.

Pulmonary TB is more frequent and totals 90% of diagnosed cases, of which 60% are smear-positive cases. Transmission mainly occurs by air when a person with smear-positive pulmonary TB, or index cases, releases the Koch bacillus (KB) in the aerosols expelled naturally when speaking, sneezing and, above all, coughing⁽⁵⁾.

Factors that influence transmission of KB in humans include index case characteristics, contact intensity and susceptibility of the recipient. Index case characteristics chiefly comprise bacillus sputum load and the overall health status of the patient. Those with better nutritional conditions have greater cough vigour and therefore release more bacilli into the environment. Intensity of contact is related to exposure time and type of relationship with the patient. Proximity and kinship are directly related and carry statistical significance in relation to infection⁽⁶⁾.

Being the member of a family and living in the same household as an individual with smear-positive pulmonary TB increases the risk of infection. Consequently, immediate and adequate investigation of these subjects is considered essential to control this disease. Contact tracing of TB cases is an effective and low-cost method that allows early detection of new active TB cases and the presence of latent tuberculosis infection (LTBI). This strategy interrupts the TB transmission chain and helps to reduce propagation microbes that are resistant to first-choice treatment drugs⁽⁷⁻⁸⁾.

Service evaluation studies related to TB contact investigation revealed the absence of systematization in the control of these individuals, although there is standardization of disease control with contacts that is widely advertised in official publications of the Brazilian Ministry of Health (MS)⁽⁹⁻¹⁰⁾. The organization of family care for smear-positive TB patients is related to compliance with directives established in the national TB control plan (PNCT). These directives are based on the evaluation of contacts by means of a protocol with standardizations for requesting and conducting tests, which divides contacts into two age groups, 10 and under and > 10 years and adults⁽⁵⁾. The evaluation of these indicators points to the quality of assistance offered by healthcare services in terms of disease control and TB prevention⁽⁹⁾.

This study is relevant due to the epidemiologic situation of TB in Brazil, in RS and the city of Pelotas-Brazil, and the importance of developing TB control actions within the family and, also, the scarcity of research on this topic. Consequently, the aim of this study is to evaluate investigations of home contacts of pulmonary TB index cases registered in the TB Control Program (PCT) of Pelotas/RS, Brazil.

METHODOLOGY

This cross-sectional quantitative study was based on medical record data of TB index cases undergoing treatment at the PCT of Pelotas/RS, Brazil, and originated from a master's dissertation titled "*Controle da tuberculose em contatos intradomiciliares: o papel dos serviços de saúde de Pelotas/RS, Brasil*"⁽¹¹⁾ [Tuberculosis home contact control: the role of healthcare services in Pelotas/RS, Brazil]. This study is an outline of the multicentre project by the Operational Research Area of the Brazilian TB Research Network (REDE-TB) "*Retardo no diagnóstico da tuberculose: análise das causas em diferentes regiões do Brasil*" [Delayed diagnosis of tuberculosis: analysis of causes in different regions of Brazil] approved and financed by the MCT/CNPq/CT-Saúde/MS/SCTIE/DECIT N°034/2008 575386/2008-8.

In the municipality of Pelotas-Brazil, with a population of 327,778⁽¹²⁾, suspected or diagnosed TB cases are referred to the PCT through the healthcare services. These services can be at any

assistance level (primary, secondary, tertiary), both in the public and private sectors. On average, the PCT accompanies 120 patients a month and provides a specialized medical team.

For the multicentre study mentioned previously, a total of 102 patients were interviewed, all of which were undergoing treatment at the PCT of Pelotas-Brazil between June and August, 2009. A portion of this population was extracted to form the sample of this study, namely patients with home contacts, leaving a total of 85 individuals. Of this total, 17 had the extrapulmonary form of TB, which does not configure risk of transmission to home contacts, resulting in the exclusion of these patients from the sample. All 163 individuals of the 68 remaining patients with pulmonary TB who claimed to have home contacts were included in the studied sample.

The data collection source comprised copies of the disease investigation records of the case registry information system, filed in the service. Pulmonary TB records containing information on contact investigations were also included. Data were collected using a research instrument designed by the study authors, based on actions set forth by the MS⁽⁵⁾ in relation to contact evaluation of tuberculosis cases. The collection period was February 2011.

Studied variables were related to characteristics of home contacts: gender (male/female); age (complete); relationship with the index case (parents/children/spouse/siblings/grand-children/other family member); and assistance offered by the PCT: contact classification (classification of contact in relation to the presence of respiratory symptoms, asymptomatic/symptomatic); request for bacilloscopy test (yes/no); request for chest x-ray (yes/no); request for tuberculin skin test (yes/no); conducted bacilloscopy test (yes/no); conducted chest x-ray (yes/no); conducted tuberculin skin test (yes/no); conduct of the PCT (asymptomatic – unevaluated; negative bacilloscopy - discarded; normal chest x-ray - discarded; asymptomatic+BCG - unevaluated; tests requested - not conducted; positive bacilloscopy – indicated treatment for active TB). The family income variable (in minimum wages) was collected from the data base of the multicentre study and subsequently categorized (less than 1/ from 1 to 2/ from 3 to 4/ and 5 or more minimum wages).

Data were typed into a base created with Excel[®] and analysed with Statistica 9.0 software by StatSoft[®], based on descriptive statistics with frequency distribution, measurements of central tendency (average and median) and measurements of dispersion measurements (standard deviation). The home contacts evaluation protocol of the MS⁽⁵⁾ was used to stratify subjects into two age groups – children 10 and under, over 10 and adults. Study variables were analysed for these two strata to create the flowchart of home contact investigations at the PCT.

Research was approved by the Research Ethics Committee of the Catholic University of Pelotas-Brazil, process number 2009/04, in accordance with ethics procedures set forth in Resolution 196/96 of the National Health Council⁽¹³⁾.

RESULTS

Total home contacts of the 68 index cases studied at the PCT of Pelotas-Brazil comprised a sample of 163 individuals. Average family members for every index case was 2.4 (DP=1.7), varying from 1 to 8 (median= 2.0). Of total home contacts, 69.9% (n=114) were considered asymptomatic and 30.1% (n=49) were symptomatic.

Table 1 shows the distribution of contacts by gender with 61.4% (n=100) women, mostly in the over 10 age group, and adults with 77.9% (n=127), with average age of 31.8 years (DP=23,2), varying from one month and 94 years. In terms of family income, 75% (n=51) survived on two minimum wages or less, with average family income of BRL992.20 (DP=949.1), varying from BRL102.00 to BRL5,000.00 and a median of BRL650.00. The relationship with index cases was predominately son or daughter, with 36.8% (n=60) of investigated contacts.

Figure 1 shows the conduct flow at the PCT during evaluation of the home contact in the study. During clinical consultation, the index case was questioned regarding presence of suggestive signs of TB among home contacts, and 30.6% (n=11) of children 10 and under and 29.9% (n=38) of children over 10 and adults were considered symptomatic by the index cases.

A bacilloscopy was requested for four (36.4%) of the symptomatic children of the 10 and under group, and three (27.3%) had the test. In relation to

Table 1 – Characterization of home contacts of pulmonary TB index cases. Pelotas, RS, 2011.

Characteristics of home contacts	Frequency (n=163)	(%)
Sex		
Female	100	61.4
Male	63	38.6
Age group		
0-10 years	36	22.1
>10 years and adults	127	77.9
Relationship with index case		
Son/Daughter	60	36.8
Spouse/Companion	34	20.9
Parent	23	14.1
Other family member	20	12.3
Sibling	14	8.6
Grandchild	12	7.4
Family income* (Minimum Wage)		
Less than 1	26	38.2
1 to 2	25	36.8
3 to 4	10	14.7
5 or more	4	5.9
Unknown	3	4.4

*Regional minimum wage of BRL511.00. Variables referent to 68 family groups in the study.

Source: database of study "Retardo no diagnóstico da tuberculose: análise das causas em diferentes regiões do Brasil". Pelotas, Brazil, 2011.

chest x-ray, 45.5% (n=5) received the request and all the contacts were x-rayed. Laboratory findings allowed the identification of one child with TB, who subsequently initiated treatment.

The bacilloscopy test was requested for 50% (n=19) of the individuals over 10, and 21% (n=8) of these tests were conducted. In terms of chest x-rays, there were requests for 34.2% (n=13), and 23.7% (n=9) of these individuals were x-rayed. For 10.5% (n=6), both a chest x-ray and a bacilloscopy were requested, of which 5.3% (n=2) conducted the tests and two were diagnosed with active TB. The tuberculin test was not applied on any of the age groups.

DISCUSSION

Contact control of TB patients is important to prevent occurrence of the disease and allow early

diagnosis of active cases in this population. It must be performed primarily among home contacts of patients with pulmonary TB and positive bacilloscopy results⁽⁵⁾.

The home contacts in this study were predominantly sons and daughters and spouses/companions, which characterizes high exposure to bacilli given the proximity and type of relationship with the patient⁽⁶⁾. Age group was predominantly >10 years and adults, which is similar to a study conducted in São José do Rio Preto-SP⁽⁹⁾. Data of the MS⁽³⁾ show that in Brazil, the disease is most frequently detected in the 25 to 35 age group and there is low incidence in the <10 year age group, although this group is generally more exposed due to the proximity and intensity of contact with the index case^(9,14).

Average residents per home in Pelotas-Brazil were 2.9⁽¹²⁾. Considering that 68 individuals were

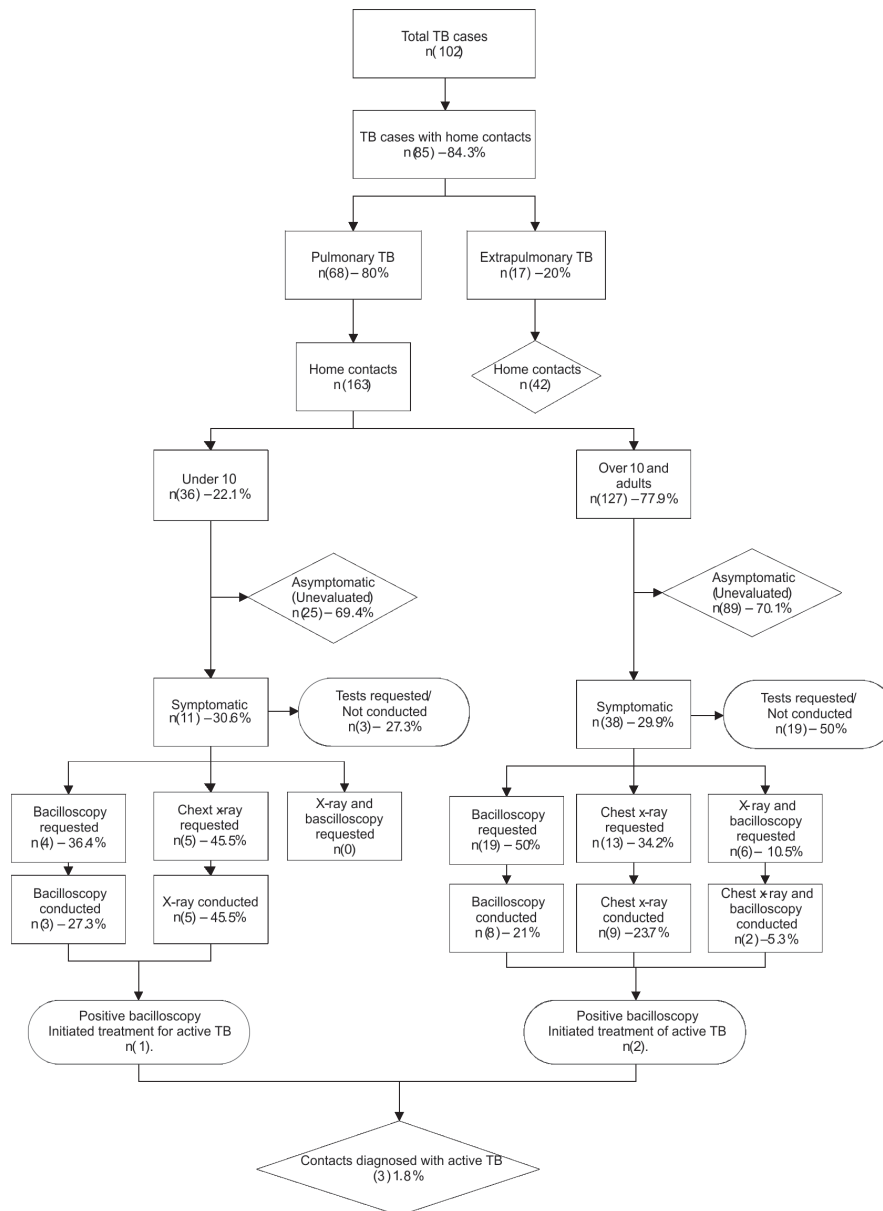


Figure 1 – Distribution flowchart of TB cases in treatment at the PCT of Pelotas/RS, Brazil and evaluation and conduct adopted by this service for home contact investigations. Pelotas, RS, 2011.

Legend: ASYMPTOMATIC: individuals who, at the moment of consultation of the index case, did not have symptoms that suggested active TB, according to information obtained from the patient.
 SYMPTOMATIC: individuals who, at the moment of consultation of the index case, presented symptoms that suggested active TB, according to information obtained from the patient.

diagnosed with pulmonary TB, estimated home contacts was 204. However, only the records of 163 individuals were found, being that 30% of these contacts were symptomatic. Sub-notification of contacts and symptomatic individuals may have occurred among the subjects, as in the study service contacts are investigated by means of information collected with the index case and not individual

clinical evaluation of each contact. This finding indicates that follow-up of TB in a single service hinders the evaluation of contacts, whether due to the excessive work load of the PCT team or difficulties due to the distances between the homes and the healthcare service.

Corroborating with the study mentioned above, a study⁽⁷⁾ conducted in the city of Bangkok

in Thailand with 325 TB index cases that sought to identify whether patients took their contacts to healthcare service for clinical evaluation, indicated that there is little collaboration (52%). This result was attributed to factors such as reduced time availability of home contacts and distance between the residence and the TB clinic. This finding can also be attributed to the fact that contacts do not undergo diagnostic testing requested by the PCT, which was especially detected in the productive age group⁽¹⁴⁾. A total of 21% underwent the bacilloscopy, 23.7% had chest x-rays and only 5.3% had both tests when requested jointly.

Low family income directly interferes with the possibility of transporting the contacts from the outskirts where they live to the clinical evaluation service at the PCT. Moreover, follow-up of TB patients conducted by a single professional team makes home visits almost impossible. Generally, in high incidence areas, the investigation of TB contact is low priority mostly due to the excessive work load for active cases, which are the priority for treatment in any PCT⁽¹⁶⁾.

In light of this scenario, basic care units are the ideal location for contact evaluations, whether by means of community health agents or the family health strategy⁽⁵⁾. Insertion of these professionals in the community facilitates effective assistance and follow-up of contacts, in addition to eliminating the need for transport of these subjects from their home to consultations at the PCT⁽⁹⁾. For this to occur, services must be reorganized with effective operation of reference and counter-reference strategies to optimize communication between the PCT and basic care units. Furthermore, basic healthcare teams must be trained to conduct the investigation procedure, according to the MS protocol. This set of actions is believed to enable early detection of cases and reflect on TB control in the municipality of Pelotas, Brazil.

For evaluation of contacts in any of the age groups, the MS recommends clinical consultation, considered essential to characterize type of contact with the index case, and symptomatological evaluation. The contact can be considered symptomatic and be investigated in a laboratory with a bacilloscopy for TB, or considered asymptomatic⁽⁵⁾.

In the latter case, children in the 10 and under age group must undergo a chest x-ray and Tuberculin Test (TT). If the result of the x-ray

raises suspicion, an active tuberculosis investigation is indicated. However, if the x-ray is normal, TT results are verified. If the TT results in induration ≥ 5 mm (in children not vaccinated with BCG, vaccinated more than 2 years ago or patients who are immunosuppressed); or ≥ 10 mm in children vaccinated with BCG less than 2 years ago, must be checked for a latent TB infection (LTBI). For cases in which TT is not indicative of LTBI treatment, it should be repeated in eight weeks to evaluate possible conversion⁽⁵⁾.

A high percentage of children who are 10 years old or under were considered asymptomatic, and were not clinically evaluated to confirm the absence of symptoms that suggest TB. Moreover, these children did not undergo the tests indicated in the MS for LTBI investigation. This result is a cause for concern considering findings of a study conducted in the Democratic Republic of Laos⁽⁸⁾ on the risk of LTBI in children who live with TB patients in the same home. This study was based on 72 index cases and 317 home contacts, of which 46.7% were children between the ages of 0 and 15. The authors concluded that the risk of children who live with TB index cases of developing LTBI was 31%. A cross-sectional study conducted in Peru⁽¹⁷⁾ with 135 children estimated that up to 50% of them developed the disease within 3 to 9 months of infection. Among adolescents, 15% would have the disease within one to two years of infection, while an estimated 5 to 10% of infected adults would develop the disease⁽¹⁰⁾. Maciel *et al*⁽¹⁸⁾ state that TB in children is a neglected problem in the healthcare agenda, and this is the age group in which TB has the greatest impact given the high morbidity and mortality rate.

For the > 10 year and adult age group, the MS recommends TT for those who are considered asymptomatic at the moment of their clinical evaluation. A chest x-ray is indicated as a response to TT ≥ 5 mm. If the result is normal, LTBI treatment should be initiated. If the x-ray is considered suspect, an investigation of active TB should be conducted. In the case of TT <5mm, the test should be repeated in eight weeks. If the new TT is within the diameter of <5mm, the contact is released and oriented. If there is conversion of the TT to ≥ 5 mm, a chest x-ray is indicated. If the x-ray is normal, LTBI treatment should be initiated. If the x-ray is suspect, presence of the active form of TB is investigated⁽⁵⁾.

A total of 70% of contacts were considered asymptomatic after evaluation based on information provided by the index case. This result discarded the TT and the asymptomatic contacts underwent chest x-rays to investigate LTBI. Detection of LTBI is fundamental to control dissemination of the disease in the community⁽⁷⁾.

It is important to highlight that bacilloscopy and chest x-ray requests for contacts considered symptomatic was below standard recommendations, considering that the National Tuberculosis Control Program stipulates that these tests should be requested for all individuals who are clinically suspected of having pulmonary TB⁽⁵⁾. This results reveals a deficiency in complying with the contact evaluation protocol on behalf of the studied service.

A total of 1.8% home contacts investigated at the PCT were diagnosed with active pulmonary TB, with one individual in the ≤ 10 age range and two in the > 10 years and adult age group. This result is identical to findings⁽⁹⁾ in a study with 166 contacts of TB cases. However, it is well below the results of a study conducted in Rio de Janeiro⁽¹⁴⁾ with home contacts in the 0-15 age range ($n=184$), of which 25 (13.6%) were diagnosed with TB. Of this total, 18 presented symptoms, namely coughing, and 7 were included in the asymptomatic group of the sample (75%). Detection of the disease was possible by means of the TT, and epidemiological, clinical and radiological data. A total of 41.3% ($n=76$) children were considered infected, of which 29.4% ($n=54$) underwent chemoprophylaxis for six months. The investigation of LTBI by means of TT among asymptomatic contact is there considered highly relevant⁽¹⁴⁾.

In this study, TT was not applied in the contacts of index cases, which can be related to the line of thought that emphasizes faults in the use of this method due to interference of BCG vaccine (*Bacille Calmette-Guérin*) that invalidates its application⁽¹⁹⁻²⁰⁾. National protocol for TB control⁽⁵⁾, however, establishes the application of TT and defends its efficiency and relevance to indicate chemoprophylaxis for LTBI. Awareness and training on this diagnostic method for professionals who work in TB programmes is therefore required to ensure compliance with the early detection strategy of TB cases⁽¹⁸⁾.

CONCLUSIONS

Results allowed the evaluation of investigations on the home contacts of pulmonary TB index

cases by the PCT of Pelotas/RS, Brazil, which was the aim of this study. Limitations of this study are the use of secondary data that were often incomplete, and quality of information.

According to observations, clinical consultations of contacts were not routine in the studied service. Index case reports were used to determine the presence or absence of respiratory symptoms. Requested tests were x-ray and bacilloscopy, and TT was not considered a determining factor for LTBI detection. A low percentage of contacts conducted the requested tests, especially in the over 10 and adult age range.

The investigation of home contacts of TB in Pelotas-Brazil presents weaknesses in terms of the adopted tools (index case interpretation, lack of diagnostic test standardization among symptomatic contacts and the absence of TT application to evaluate LTBI) to classify symptomatic or asymptomatic contacts.

Assistance for home contacts in Pelotas-Brazil requires the development of a local primary care policy that is committed to the patient and his or her contacts. Adequate clinical evaluation of contacts and timely interruption of the TB transmission chain is essential to facilitate early diagnosis. Furthermore, a permanent training policy for professional teams who provide TB assistance should be incorporated, based on the protocol established by the MS.

Finally, findings stress the importance of new studies on disease control of index cases and their contacts within the scope of primary healthcare. Knowledge on this scenario will evidently help professionals involved in TB assistance services to understand the relevance of this scenario in the organization of effective actions to interrupt the TB transmission chain.

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