



## Coinfection of Tuberculosis / Human Immunodeficiency Virus in an Administrative District in the City of São Paulo\*

*Coinfecção de Tb/HIV em um distrito administrativo do Município de São Paulo*

*Coinfección de TB/VIH en un distrito administrativo del Municipio de Sao Paulo*

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### ABSTRACT

**Objective:** To characterize the sociodemographic and epidemiological profile of people coinfecting with Tuberculosis (TB) and Human Immunodeficiency Virus (HIV), who were residents in the administrative district of Capão Redondo in the city of São Paulo, during the period between 2000 to 2009. **Methods:** This was a retrospective study. Results: From a total of 1,612 TB cases, 162 cases were positive for HIV. There was a predominance in the age group of 30 to 39 years (39.5%), male gender (61.1%) and the pulmonary form (68.5%). Only 47.5% of cases progressed to obtain the cure, 13% abandoned treatment and 32.2% died. **Results:** The results emphasize the need for knowledge of the situation of TB / HIV co-infection in order to offer adequate assistance to these clients, considering that neither of these diseases can be discussed in isolation. **Conclusion:** We conclude that cases of TB / HIV association contribute to non-adherence to treatment and increased mortality. **Keywords:** Tuberculosis; HIV; Epidemiology descriptive

### RESUMO

**Objetivo:** caracterizar o perfil sócio-demográfico e epidemiológico de pessoas com co-infecção Tb/HIV, residentes no distrito administrativo Capão Redondo do Município de São Paulo no período de 2000 a 2009. **Métodos:** Trata-se de um estudo retrospectivo. **Resultados:** De um total de 1.612 casos de tuberculose, 162 casos foram positivos para o HIV. Houve predomínio da faixa etária de 30 a 39 anos (39,5%), sexo masculino (61,1%) e a forma pulmonar (68,5%). Apenas 47,5% dos casos evoluíram para a cura, 13% abandonaram o tratamento e 32,2% foram a óbito. **Resultados:** Ressalta-se a necessidade do conhecimento da situação da co-infecção Tb/HIV no sentido de oferecer uma assistência adequada a esta clientela, considerando que ambas as enfermidades não podem ser discutidas isoladamente. **Conclusão:** Conclui-se que os casos de associação Tb/HIV contribuem para a não adesão ao tratamento e aumento da taxa de mortalidade.

**Descritores:** Tuberculose; HIV; Epidemiologia descritiva

### RESUMEN

**Objetivo:** caracterizar el perfil sociodemográfico y epidemiológico de personas con coinfección TB/VIH, residentes en el distrito administrativo Capão Redondo del Municipio de Sao Paulo en el período de 2000 a 2009. **Métodos:** Se trata de un estudio retrospectivo. **Resultados:** De un total de 1.612 casos de tuberculosis, 162 casos fueron positivos para el VIH. Hubo predominio del grupo etáreo de 30 a 39 años (39,5%), sexo masculino (61,1%) y la forma pulmonar (68,5%). Apenas el 47,5% de los casos evolucionaron para la cura, 13% abandonaron el tratamiento y 32,2% fueron a óbito. **Resultados:** Se resalta la necesidad de conocimiento de la situación de la coinfección TB/VIH en el sentido de ofrecer una asistencia adecuada a esta clientela, considerando que ambas enfermedades no pueden ser discutidas aisladamente. **Conclusión:** Se concluye que los casos de asociación TB/VIH contribuyen para la no adhesión al tratamiento y aumento de la tasa de mortalidad.

**Descriptores:** Tuberculosis; VIH; Epidemiología descriptiva

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## INTRODUCTION

Tuberculosis (Tb) is considered a public health problem, particularly in developing countries, such as Brazil, in which the epidemiological scenario is aggravated by the increase in poverty, growth of marginal populations, migratory movements in search of better quality of life and by the acquired immunodeficiency syndrome (AIDS) epidemic<sup>(1)</sup>. According to information from the World Health Organization (WHO), the occurrence of 9.27 million cases of Tb was estimated in 2007, and 15% of these cases were seropositive for the human immunodeficiency virus (HIV). In 2009, for the control of Tb, the World Health Organization (WHO) proposed the following goals: a reduction in the incidence coefficient, 50% reduction in the prevalence and death rates in comparison with 1990, detection and treatment of at least 70% of the cases with positive bacilloscopy that must be detected and treated in the Directly Observed Therapy (DOT) program, and discharge because of cure of at least 85% of the diagnosed cases<sup>(2)</sup>.

According to the WHO, India is the country with the highest number of Tb cases in the world, presenting an incidence coefficient of 168 cases/100,000 inhabitants. In this context, Brazil is among the 22 countries responsible for 80% of the total number of Tb cases in the world, and in 2007, the occurrence of 92,000 cases of Tb was estimated, which corresponds to an incidence coefficient of 48 cases/100,000 inhabitants. For pulmonary cases in baciliferous patients, the incidence coefficient was 26 cases/100,000 inhabitants and the percentage of Tb/HIV coinfection was 14%. With regard to the result of treatment, the percentage of cure was 72%, abandonment of treatment 8.3% and death 4.2%<sup>(2)</sup>.

From this aspect, in the Municipality of São Paulo, in 2008, there were 5,668 cases notified, which represent an incidence coefficient of 52.1 cases/100,000 inhabitants. The predominant age-range was between 20 years and 39 years, corresponding to 45.6% of the total<sup>(3)</sup>. The administrative district of Capão Redondo, scenario of the present study showed an incidence coefficient of 60.3 cases/100,000 inhabitants in 2009.

The living and working conditions of persons are unquestionably factors determining the occurrence of Tb. However, the possibility of being infected by the Koch bacillus is subject to certain conditions inherent to the transmission process, such as intensity, frequency and duration of exposure to the bacillus. Moreover, HIV infection is one of the main risk factors for the development of active Tb, due to the favorable conditions derived from the affected person's compromised immunological response. Tb is considered a disease associated with AIDS, as a result of the pathological interaction and combination of various factors that favor the progression of these two diseases<sup>(4,5)</sup>.

Seropositivity for HIV is frequently identified during the diagnostic process of Tb. It is estimated that in Brazil,

a request for testing occurs in approximately 70% of cases with diagnosis of Tb, and that of these 15% are positive<sup>(6)</sup>. This low percentage is justified by the fact that the serological test for HIV is an instrument of discrimination against infected persons because, in spite of being recommended by the Ministry of Health, the authorized consent of the person who is ill is required to perform this test<sup>(5)</sup>. The risk of a person with the coinfection developing Tb is from 8% to 10% per year, and in the person who is seronegative for HIV, this is maintained throughout life. Furthermore, the epidemiological importance of coinfection is evident when one considers that in the group of coinfecting individuals, the death rate is around 20%<sup>(6)</sup>.

In the face of almost two decades of universal access to antiretroviral treatment being in force and the high prevalence of Tb/HIV coinfection in Brazil, extension of the practice of serological testing for HIV is urged, with a view to making early diagnosis and potentiating the impact on the reduction of transmission of HIV, morbidity and mortality due to AIDS<sup>(6)</sup>. Moreover, the need for knowledge of the situation of Tb/HIV coinfection is emphasized, in order to plan adequate assistance, considering that taking care of a person with both illnesses cannot be fragmented in the same way as interventions performed in the collective society.

Therefore, the aim of the present study was to describe the sociodemographic and epidemiologic profile of person with Tb/HIV coinfection, resident in an administrative district of the Municipality of São Paulo.

## METHODS

This study of a quantitative nature was developed, using a descriptive design by means of secondary data, and those with reference to the period between 2000 and 2005 were extracted from Epi-Tb, a computerized system in DOS, and for the remainder of the study period, TBWEB was consulted, which is an on-line system, implemented in 2006 to replace Epi-Tb. The persons in the population during the period considered in the study were consulted at the site of the Department of Informatics of the Brazilian national health system "Sistema Único de Saúde" (DATASUS).

Descriptive analysis of the data involved sociodemographic variables (gender, educational level, age-range) and clinical variable (type of house, classification, type of treatment, location where care is received and reason for closure of the case). The data were tabulated in two databases with the aid of the resource of the Excel software program Chart Reports and Dynamic Graphs and presented by descriptive results. For data extraction, duplicated records of cases contained in the database were excluded.

The study scenario was the administrative district of Capão Redondo, located in the region South of the Mu-

nicipality of São Paulo, which integrates the Sub-municipality of Campo Limpo with the districts of Vila Andrade and Campo Limpo. According to information in the site of the Mayor of the Municipality of São Paulo, Capão Redondo has an area of 13.85 km<sup>2</sup>, with an estimated population of 270,826 inhabitants in 2008, resulting in a demographic density of 19,547.84 inhabitants/km<sup>2</sup>.

In order to conduct the above-mentioned study, the research project was previously submitted for appreciation and approval of the Ethics Committee on Research involving Human Beings, of the School of Nursing, University of São Paulo, and the Municipal Secretary of Health, Protocol No. 783/2006.

## RESULTS

In this study, it was found that of the 1,612 cases notified in the period between 2000 and 2009, in persons resident in Capão Redondo, 82.7% had the anti-HIV test performed, and of these, 162 cases were positive for the exam, therefore, Tb/HIV coinfection represented 10.1% of the total number of cases.

The data shown in Table 1 present the number and percentage of cases of Tb/HIV coinfection resident in the administrative district of Capão Redondo, notified between 2000 and 2009, according to some of the socio-demographic variables. In this Table, predominance of the male gender (61.1%) is observed and in almost all the years analyzed, except in 2000 and 2001, in which there was an inversion; and these presented 43.8%, 47.8%, respectively.

**Table 1**—Distribution of persons with Tb/HIV coinfection, according to sociodemographic variables. Capão Redondo, 2000 and 2009. n=162

Variables	n (%)
<b>Gender</b>	
Male	99 (61.1)
Female	63 (38.9)
<b>Age Group (years)</b>	
5-9	3 (1.9)
10-19	0 (0)
20-29	30 (18.5)
30-39	64 (39.5)
40-49	40 (24.7)
50-59	20 (12.3)
60 and +	5 (3.1)
<b>Educational level (years)</b>	
none	5 (3.1)
1-3	14 (8.6)
4-7	44 (27.2)
8-11	41 (25.3)
12 and +	6 (3.7)
Without information	52 (32.1)

Young adults were those most affected by the coinfection, with the larger proportion in the age-range between 30 and 39 years (39.5%), followed by those between 40 and 49 years (24.7%), between 20 and 29 years (18.5%), and those under the age of 15 years, in whom only three (1.9%) cases were notified. The age-range over 60 years represented five cases (3.1%).

As regards the educational level, it was verified that 52.5% of Tb/HIV coinfection occurred in persons who presented from 4 to 11 years of schooling, and 27.2% in those who declared having 4 and 7 years of schooling, and 25.3%, who had 8 and 11 years of schooling. Only 3.1% of persons mentioned that they had no schooling.

The characterization of persons coinfecting with Tb/HIV according to the clinical variables is presented in the data in Table 2.

**Table 2**—Distribution of persons with Tb/HIV coinfection, according to clinical variables. Capão Redondo, 2000 and 2009. n=162

Variables	n (%)
<b>Type of Case</b>	
New	138 (85.2)
Retreatment abandonment	12 (7.4)
Recurrence/Relapse	9 (5.6)
Retreatment failure	3 (1.9)
<b>Classification</b>	
Pulmonary	89 (54.9)
Extrapulmonary	51 (31.5)
Pulmonary + Extra	22 (13.6)

With regard to the type of case, Table 2 shows the predominance of new cases, with 138 cases (85.2%), followed by cases of post-abandonment retreatment with 12 cases (7.4%) and recurrence/relapse with 9 cases (5.6%). The cases of retreatment due to failure of treatment totaled 3 cases (1.9%).

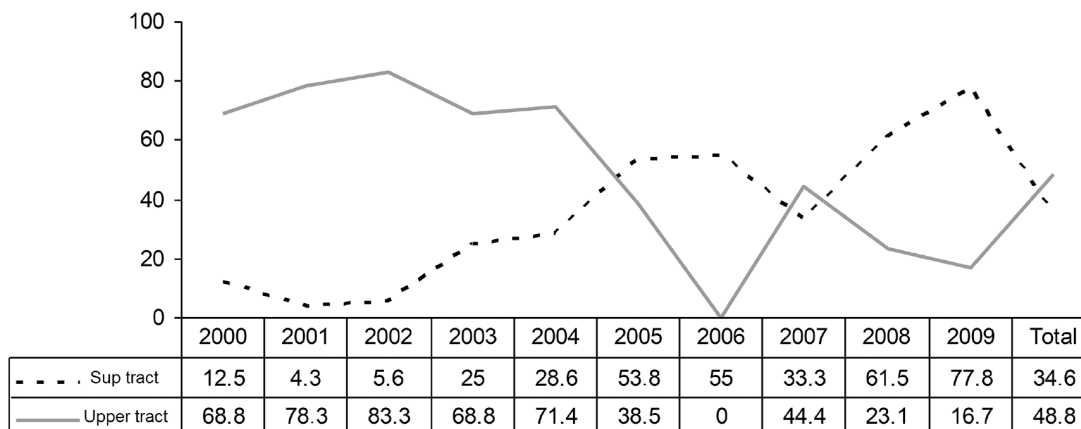
As regards the classification of Tb, the order of frequency was pulmonary (54.9%), extrapulmonary (31.5%) and the associated form (pulmonary and extrapulmonary) with (13.6%). As far as the type treatment was concerned, the leading form was the self-administered type with 48.8%, followed by supervised treatment with 34.6%. For this variable, it was verified that 16.7% of the cases did not contain information about whether the treatment modality performed was supervised or not. As illustrated in Graph 1, in which one observes that at the beginning of the studied period, particularly in 2001 and 2002, the percentage of supervised treatment performed was not very significant, but as from 2003, this was intensified and reached a percentage equal to 28.6% of supervised cases in 2004.

In 2009, supervised coverage was attained in 77.8% of the cases, however, in the study period there was an ascending line of medication supervision, with a small

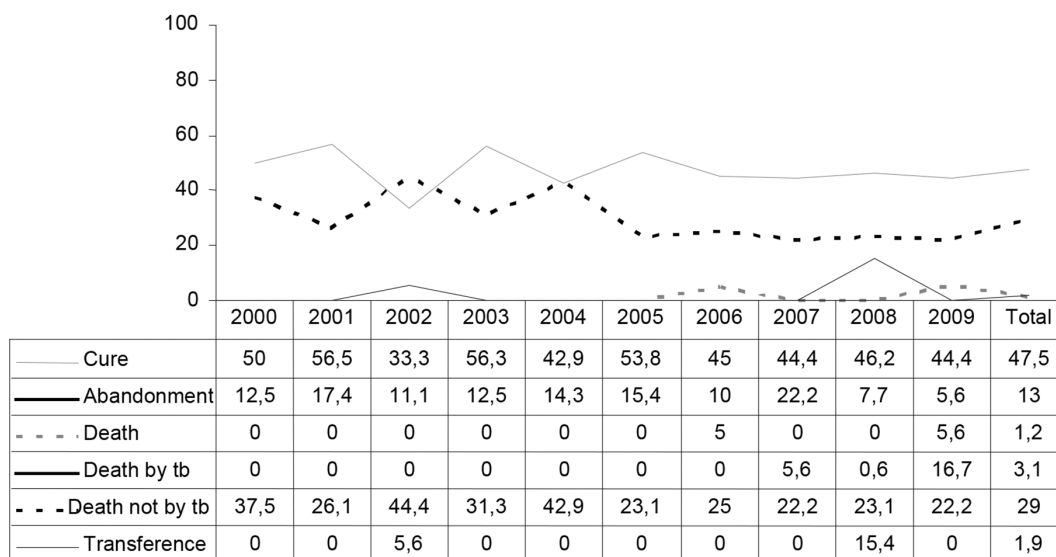
reduction in 2007. For this variable it was observed that 27 of the cases did not contain information about the type of medication supervision.

As regards to location where care was provided, 56.8% of the co-infected patients received treatment for Tb at Reference Centers for STD/AIDS, 30.2% at ambulatory clinics and only 12.3% at health units. For only one of these patients, treatment was provided at a female penitentiary.

In the analysis in Graph 2, the reasons for closure of Tb/HIV cases can be verified, showing that discharge due to cure was 47.5%, the minimum value of 33.3% in 2002 and that maximum was 56.5% in the previous year. Abandonment of treatment was 13%, a much higher percentage than that recommended by the Ministry of Health, which is up to 5%. Deaths, whether or not Tb was the basic cause, amounted to 32.1% of the total number of cases.



Graph 1 – Distribution of persons with Tb/HIV coinfection, according to the type of treatment. Capão Redondo, 2000 and 2009.



Graph 2 – Distribution of persons with Tb/HIV coinfection, according to closure. Capão Redondo, 2000 and 2009.

## DISCUSSION

Although serological testing in all persons diagnosed with Tb is a Ministry of Health recommendation, it was verified that 17.3% of the cases notified for Tb did not undergo the serological test for HIV.

A study conducted in a region of the Municipality of Belo Horizonte, with the aim of describing the profile of Tb cases, found that 12.9% of those who were ill were also seropositive for HIV<sup>(7)</sup>.

The greater occurrence of Tb in persons of the male gender found in this study is corroborated by the literature, in which various studies have demonstrated that in patients infected with HIV, Tb affects a higher proportion of persons of the male gender<sup>(5,8-10)</sup>. The conditional factors for men more frequently being taken ill with Tb have not yet been well explained, and may be related to various conditions, both of a biological order and related to self-care of health, and even to under-diagnosis in women<sup>(8,11)</sup>. In addition, the more frequent

occurrence of these two diseases may be related to the lifestyle of young adults, in whom permissive and promiscuous behaviors are more present, resulting in greater exposure to *Mycobacterium tuberculosis* and HIV<sup>(12)</sup>.

Various researches have examined the relationship between the demand for and access to health services by men<sup>(12-14)</sup>. The existent belief among men that they are physically stronger than women, and the perception that they are invulnerable and immune to diseases, contributes to their delay in seeking assistance to the maximum extent. This being so, in the majority of instances they seek a health service when they are no longer able to deal with the symptoms; that is to say, when the disease is already fully in progression. The lack of time available to seek a health service, incompatibility between the time when the services are working and their time of work, associated with the risk of losing their jobs as a result of absenteeism due to illness, also makes it difficult for men to seek the health services<sup>(12)</sup>. From this aspect, the difficulty men have in verbalizing their health needs may also be verified<sup>(14)</sup>.

It is believed that women seek the health services more assiduously than men do, as they seek more preventive actions, or have routine exams performed, rather than only going for consultations because of illness. Considering that health requirements are the main determinant of the use of health services, the higher frequency of medical consultation by women may be explained by their concern about caring for their health<sup>(15)</sup>.

With regard to age-range, the larger number of persons at a productive age being affected, as observed in this study, may generate important social problems, bearing in mind that these individuals should be included in the work market, providing the means to support their families<sup>(9)</sup>. Moreover, the occurrence of Tb in elderly persons may be related to the high proportion of individuals with latent infection as well as the increase in life expectancy.

The findings of this study do not exactly reflect the reality of the historical series of Tb/HIV of the inhabitants of Capão Redondo as regards the educational level of coinfecting persons, bearing in mind that in 32.1% of cases there was no information about this variable. Starting with the pre-supposition that the absence of information lower than 10% is classified as "good", from 10% to 29% as "regular" and higher than 30%, as "precarious"<sup>(16)</sup>. It is therefore emphasized the adequate filling out, with quality information, of all the components of the compulsory notification charts inserted into the database of the information systems consulted, enables the correct apprehension of Tb/HIV coinfection.

The predominance of the pulmonary form of Tb was also verified. A similar situation was observed in a study conducted in a reference service in MatoGrosso do Sul, in which this form of Tb was found in 50%, 31.8% and

18.2%, respectively<sup>(10)</sup>. The incidence of the extrapulmonary form found in this study corroborates the results of other researches developed on the epidemiological aspect of Tb/HIV coinfection<sup>(5,9-10,17)</sup>. It was observed that supervised treatment has increased in Capão Redondo. In a study developed in Ribeirão Preto, it was possible to observe that only 33% of the patients underwent supervised treatment, as many died in the first month of treatment. The authors drew attention to some factors that may be interfering in the management of cases, such as performing Tb diagnosis at a late stage, and the use of chemical prophylaxis for persons with HIV/AIDS<sup>(9)</sup>.

The practice of supervised treatment minimizes the problem of abandonment of treatment in persons with Tb/HIV coinfection, considering that HIV infection predisposes to the increase in frequency of adverse events, given the elevated quantity of medications ingested on a daily basis. From this aspect, supervised treatment is outstanding as a facilitator of adherence to treatment, because it allows one to know the ill persons in the context of their lives and to form ties with them and their families, among others<sup>(18,19)</sup>.

Adherence to treatment for Tb goes beyond the biological, clinical and behavioral character, and above it is all associated with the understanding that ill persons have about their illness, the place they occupy in the process of social production and reproduction and the aspects with respect to the organization of the health services<sup>(20)</sup>. The medication schemes used for the treatment of Tb are the same, irrespective of whether there is coinfection. However, in the latter situation, immunodepression intensifies the adverse reactions of medications, increasing the chance of abandoning treatment and death<sup>(6)</sup>.

Analysis of the historical series of Tb/HIV in Capão Redondo allowed one to find that fewer than half of the cases were discharged due to being cured. A higher percentage (58.7%) was found in a study conducted in Recife-PE; in which the percentage of discharge due to abandonment was 13%, with a range from 5.6% to 22.2%. Discharge due to death reached a percentage of 32.1%, and of these, 29% had causes other than Tb<sup>(21)</sup>.

In a study conducted in Ribeirão Preto-SP, a municipality with a high coinfection rate (30%), a mean discharge of 52% due to cure; abandonment of 11% and death of 12% was observed<sup>(9)</sup>. In another study conducted in a reference service in MatoGrosso do Sul, it was found that the occurrence of Tb was 13.5% in patients with HIV. In this study the results were better: 69.7% discharge due to cure; 9.1% due to death and 3% due to abandonment<sup>(10)</sup>.

As regards abandonment of treatment, it was shown that there were various conditioning factors related to both ill persons and the health services. With reference

to ill persons, it was found that there were socioeconomic conditions, among these low educational levels, insufficient financial resources, and others, such as side effects of the medications, use of legal and illicit drugs, lack of motivation, and feeling of being cured after improvement in the clinical condition. As regards factors related to the health services, the factors mentioned were lack of information about the disease and treatment, the physical structure that did not favor privacy, absence of team work and difficult access to the service<sup>(18)</sup>.

The individual infected by HIV presents a much higher risk for becoming ill due to Tb than the general population, and therefore routine performance of the anti-HIV test is important at the time of diagnosis of Tb, with a view to intensifying the discovery of cases and providing subsidies for surveillance of coinfection. The anti-HIV test presents benefits not only for the tested person, who will be favored with the early diagnosis and the possibility of using antiretroviral drugs, with increased in life expectancy, but also for other persons potentially exposed to infection. The other value of serological testing for HIV lies in subsidizing the epidemiological characterization and preparation of an effective control policy<sup>(17)</sup>.

According to the new Manual of Recommendations for the Control of Tb in Brazil, the integration between the Tuberculosis Control Programs and STD/AIDS Programs is fundamental for successful therapy; that is to say, for cure. Therefore, control of Tb/HIV coinfection requires the implementation of a program that allows the load of both diseases, with articulated actions, forming an integral, swift and resolute care network. To do this, the following objectives are proposed: guarantee patients with Tb early access to diagnosis of infection by HIV, by means of offering the test and access to antiretroviral treatment when pertinent<sup>(6)</sup>.

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## CONCLUSION

The results found in this study revealed that 10.1% of the persons with Tb were found to be infected with HIV, thus explaining its epidemiological relevance in the occurrence of Tb. The non performance of the anti-HIV test in all cases of Tb, prevents knowledge of the real magnitude of the prevalence of coinfecting persons. Therefore, the purpose of this study was to contribute to the knowledge of the evolution of Tb/HIV coinfection in the administrative district of Capão Redondo, in period of 10 years, with a view to subsidizing the reorganization of the assistance provided. Although Tb is a disease capable of being prevented and cured, and its treatment is free of charge, it continues to be a source of concern in the Brazilian and World scenario, either by its social determination because its occurrence is strictly linked to the living conditions of the population, or because it is considered an opportunist disease of AIDS. Therefore, the importance is emphasized of performing the anti-HIV test for all persons with diagnosis of Tb, given the relationship between the two diseases, which implies the need for health professionals to incorporate this practice in their work processes, with a view to early diagnosis of Tb in persons with HIV.

It is worth pointing out that adherence to Tb treatment continues to be a challenge to Tb and AIDS control programs, even with the institution of supervised treatment. Therefore, it is believed that health professionals must be made aware of the specificities of this segment of ill persons, in order to develop qualified assistance, provide a favorable reception and actively listen to these patients, thereby seeking to encourage them to adhere to treatment and control their own health, improving their survival and contributing to the protection of susceptible persons.

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