# Epidemiological profile of hospitalized patients with TB at a referral hospital in the city of Rio de Janeiro, Brazil*

## Perfil epidemiológico de pacientes portadores de TB internados em um hospital de referência na cidade do Rio de Janeiro

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## Abstract

**Objective:** To determine the epidemiological profile of inpatients at a TB referral hospital. **Methods:** This was a descriptive, retrospective study of the medical charts of patients with TB hospitalized at the *Hospital Estadual Santa Maria* (HESM), in the city of Rio de Janeiro, Brazil, between January of 2002 and December of 2003. Data were collected using a standardized form. **Results:** Of the 451 patients included in the study, 313 (69.4%) had been referred to the HESM from health care clinics, and 302 (67.0%) were male. Most of the patients were in the 30-59 year age bracket, 443 (98.2%) lived in the greater metropolitan region of Rio de Janeiro, and 298 (66.1%) lived in the city of Rio de Janeiro itself. The most common reason for hospitalization was poor health status (in 237, 52.5%). The most common comorbidity was AIDS (in 137, 30.4%). The most common signs and symptoms at admission were weight loss, fever and productive cough. Sputum smear microscopy was positive in 122 (71.0%) of the patients presenting with productive cough at admission. Of the 212 patients being retreated, 156 (73.6%) reported noncompliance with previous treatment. Regarding the outcome, 273 (65.8%) of the patients were referred to municipal health care centers, 83 (18.4%) died, 44 (9.8%) were cured, and 27 (6%) were discharged against medical advice. **Conclusions:** Providing hospitals specializing in TB is relevant for TB control, especially in metropolitan regions. In addition to taking biosafety measures, these hospitals must be prepared to treat patients with TB-related comorbidities and social problems. This study has resulted in improvements at the HESM.

**Keywords:** Tuberculosis; Epidemiology; Hospitalization.

## Resumo

**Objetivo:** Analisar o perfil epidemiológico dos pacientes internados em um hospital especializado no tratamento da TB. **Métodos:** Foi realizado estudo descritivo e retrospectivo dos prontuários dos pacientes internados com TB no Hospital Estadual Santa Maria (HESM), na cidade do Rio de Janeiro, entre janeiro de 2002 e dezembro de 2003, por meio de formulário previamente padronizado. **Resultados:** Dos 451 pacientes incluídos, 313 (69,4%) foram referenciados para o HESM por unidades de saúde, e 302 (67,0%) eram do gênero masculino. A maioria dos pacientes tinha entre 30 e 59 anos, 443 (98,2%) residiam na região metropolitana, e 298 (66,1%) residiam no município do Rio de Janeiro. O motivo de internação mais frequente foi mau estado geral (em 237, 52,5%). A AIDS foi a comorbidade mais frequente (em 137, 30,4%). Os sinais e sintomas mais frequentes no momento da internação foram emagrecimento, febre e tosse produtiva. A baciloscopia foi positiva em 122 casos (71,0%) com tosse produtiva no momento da internação. Dos 212 pacientes que estavam em retratamento, 156 (73,6%) referiram abandono a tratamento anterior. Quanto ao desfecho, 297 (65,8%) foram encaminhados para centros municipais de saúde, 83 (18,4%) evoluíram para óbito, e 44 (9,8%) curaram. As altas indesejadas ocorreram em 27 (6,0%) dos casos. **Conclusões:** A provisão de hospitais especializados em TB é de relevância para o controle da TB, principalmente em regiões metropolitanas. Esses hospitais precisam estar adequados a medidas de biossegurança, assim como estar mais bem equipados e capacitados para prestar atendimento a pacientes com diversas comorbidades e problemas sociais associados à TB. A realização deste estudo resultou em melhorias para o HESM.

**Descritores:** Tuberculose; Epidemiologia; Hospitalização.

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## Introduction

Worldwide, TB is a serious public health problem and is still one of the principal causes of death due to infectious disease in adults, principally in developing countries.[1,2]

In 1993, the World Health Organization (WHO) declared TB a global emergency and proposed the implementation of the supervised treatment strategy. This strategy resulted in higher cure rates in various countries. However, it has had variable and limited success in reducing TB incidence rates in developing countries, principally in large metropolitan centers and in areas of increased HIV infection, as well as in reducing the occurrence of multidrug-resistant TB (MDR-TB), defined as the simultaneous resistance to rifampin and isoniazid, or extensively drug-resistant (XDR) TB, defined as the resistance to rifampin and isoniazid, as well as to at least one fluoroquinolone and to one injectable drug used in second-line regimens.[3] In most cases, MRD-TB or XDR-TB results from the inappropriate use of the medication or from the great potential for transmission in enclosed places (hospitals, prisons, nursing homes and shelters), where TB patients infected with HIV are most often treated and where the appropriate biosafety precautions are rarely taken. In hospitals, the TB problem has been ignored or underestimated, due to the fact that, from the middle of the 20th century, an advantage of the outpatient treatment in relation to hospitalization for the treatment of the disease has been observed. In Brazil, it implied, after the 1980s, in the closing of sanatoriums where TB patients were treated. Only recently, with the MDR-TB and XDR-TB outbreaks which took place in hospitals, both in developed and developing countries, it has become a consensus that hospitalization of selected cases is still necessary and that the control measures in hospitals must be promoted. A survey conducted in public and private hospitals in seven large cities in Asia and Northern Africa showed that these hospitals, with the exception of those in Bangkok, did not conduct outpatient treatment in accordance with the recommendations of the local programs. The treatment offered was not always free to patients, many hospitals never reported TB cases, there were no standardized regimens, and the evolution of the cases, as well as their outcomes, was unknown.[2] Therefore, in 2006, in the new WHO global TB control plan STOP TB, the implementation of TB control measures in hospitals and prisons was considered one of the high-priority strategies.[4]

In Brazil, there are important regional differences regarding the TB and MDR-TB control markers. In some regions of the state of Rio de Janeiro, Brazil, a greater severity of the situation is more severe, with epidemiological markers similar to those described in African countries.[5]

In developed countries, the leading cause of hospitalization is treatment failure or the side effects of the medication, whereas, in developing countries, the leading causes of hospitalization are poor health status and wasting, indicating the flaws in the process of identifying cases not detected in the initial phases of the disease.

In the state of Rio de Janeiro, there are two referral hospitals for the hospitalization of TB patients and TB/HIV/AIDS patients; one of those is the *Hospital Estadual Santa Maria* (HESM, State Hospital of Santa Maria), located in the in the Jacarepaguá district of the city of Rio de Janeiro.

The HESM currently has 73 active beds to treat a clientele comprised mostly of individuals who belong to economic levels D and E, according to theBrazilian Economic Classification Criterion. Adult patients of both sexes are treated at the HESM. Medical care, from admission to discharge, is provided by a multidisciplinary team.

The HESM has an active Committee for Nosocomial Infection Control, which suggested the establishment of certain biosafety norms. The following administrative measures were adopted: training of health professionals; distribution of the patients in floors according to the risk of transmission; monitoring of the health of professionals (tuberculin testing); timely performance of sputum smear microscopy;health education for inpatients; and guidelines for the flow of patients. Regarding engineering and architectural measures, the construction of individual rooms for patients with MDR-TB/XDR-TB was necessary; the infirmaries were renovated and downsized; the number of beds was decreased; and a room for the collection of induced sputum was built in accordance with the biosafety norms. Personal protective measures, such as the use of N95 masks by professionals and the

**Table 1 -** Distribution of the reasons for hospitalization of the 451 studied inpatients in the State Hospital of Santa Maria, Rio de Janeiro, Brazil, between 2002 and 2003.

| Reason for hospitalization | n | % |
|---|---|---|
| Health status did not allow for outpatient treatment[a] | 237 | 52.5 |
| Social causes[b] | 130 | 28.8 |
| Intolerance/drug-induced toxicity uncontrollable in outpatient clinic | 77 | 17.1 |
| Severe TB complications[c] | 30 | 6.7 |
| Severe clinical or surgical complications | 26 | 5.3 |
| Nonspecified[d] | 45 | 9.9 |
| Others | 29 | 6.4 |

[a]Health status included 66 cases (27.8%) that were considered wasting. [b]Social causes, such as homelessness or belonging to a risk group for treatment abandonment, especially in cases of retreatment or treatment failure. [c]Severe TB complications, except for poor health status (voluminous hemoptysis, respiratory failure, etc.). [d]No information on the admission chart.

use of surgical masks by the patients, were also implemented.

Patients diagnosed with active TB must be referred from the Municipal Health Departments (MHDs) or from general hospitals, and referred back to those facilities at discharge.

During the last two decades, few studies on hospitalization for TB have been conducted in Brazil. It is a result of the narrow epidemiological view of the public health officials, who do not "realize" or prioritize a problem of such magnitude: there is a lack of TB control interventions integrated into the various levels of health care (primary, secondary and tertiary). We also highlight the lack of specific legislation about the treatment of TB cases in hospitals. Only a few hospitals, typically only university hospitals, conduct TB control activities.

Therefore, we believe it is important to analyze the clinical and epidemiological aspects of inpatients at TB referral hospitals in the state of Rio de Janeiro. To that end, we analyzed hospitalizations for TB occurring between January of 2002 and December of 2003 at the HESM.

## Methods

This was a descriptive, retrospective and epidemiological study based on the charts of inpatients with active TB. The reference population comprised inpatients at TB referral hospitals in the state of Rio de Janeiro, Brazil. The studied population comprised patients treated at the HESM. Patient charts were selected based on the following criteria: legible notations; admission between January of 2002 and December of 2003; diagnosis of TB or TB/HIV/AIDS coinfection. The following variables were analyzed: gender; city of residence; reason for hospitalization; history of previous treatment; signs and symptoms at admission; comorbidities; sputum smear microscopy at admission; and outcome.

The study was approved by the Research Ethics Committee of the Federal University of Rio de Janeiro Clementino Fraga Filho University Hospital (Process no. 008/07).

## Results

During the study period, 542 patients were admitted to the HESM; of those, 43 were excluded due to failure to locate the corresponding charts in the hospital files, and 48 were excluded due to being later diagnosed with illnesses other than TB. We also highlight the poor quality in relation to the recording of the patient data in the medical chart.

The participating population comprised 451 patients, and 67% of those were male.

**Table 2 -** Distribution of inpatients at the State Hospital of Santa Maria, Rio de Janeiro, 2002/2003, according to information on previous TB treatment.

| Previous TB treatment | n | % | Treatment outcome | n | % |
|---|---|---|---|---|---|
| Yes | 212 | 47.0 | Finished treatment | 40 | 18.9 |
| | | | Abandoned treatment | 156 | 73.6 |
| | | | No information | 16 | 7.5 |
| | | | Subtotal | 212 | 100.0 |
| No | 221 | 49.0 | | | |
| No information | 18 | 4.0 | | | |
| Total | 451 | 100.0 | | | |

**Table 3 -** Distribution of signs and symptoms reported by the 451 studied patients at admission to the State Hospital of Santa Maria, Rio de Janeiro, 2002/2003.

| Signs and symptoms reported at admission | n | % |
|---|---|---|
| Weight loss | 336 | 74.5 |
| Fever | 243 | 53.8 |
| Productive cough | 195 | 43.2 |
| Dyspnea | 133 | 29.5 |
| Dry cough | 76 | 16.8 |
| Chest pain | 59 | 13.1 |
| Bloody sputum/hemoptysis | 31 | 6.8 |
| Anorexia | 30 | 6.6 |

Regarding age bracket, 32.1% of the male patients were aged 40-49 years, and 24.8% of the female patients were aged 30-39 years. Approximately 90% of the inpatients in the HESM presented the pulmonary form of the disease.

Evaluating the distribution of the patients according to the city of residence, we observed the following: approximately two thirds of the population resided in the city of Rio de Janeiro; approximately one third resided in other cities of the metropolitan areas I and II; and only 1.8% of the patients resided in the interior of the state of Rio de Janeiro. Metropolitan areas I and II comprise the following cities: Belford Roxo, Duque de Caxias, Guapimirim, Itaboraí, Japeri, Magé, Mesquita, Nilópolis, Niterói, Nova Iguaçu, Paracambi, Queimados, São Gonçalo, São João de Meriti, Seropédica and Tanguá, as well as the city of Rio de Janeiro itself.

**Table 4 -** Distribution of inpatients at the State Hospital of Santa Maria, Rio de Janeiro, 2002/2003, by comorbidity.

| Comorbidity[a] | n | % |
|---|---|---|
| AIDS | 83 | 30.4 |
| Hepatitis | 43 | 15.8 |
| Diabetes mellitus | 42 | 15.4 |
| Pneumonia | 35 | 12.8 |
| Systemic arterial hypertension | 27 | 9.9 |
| Psychiatric disorders | 21 | 7.7 |
| COPD | 14 | 5.1 |
| Congestive heart failure | 08 | 2.9 |
| Total | 273 | 100.0 |

[a]Some patients presented more than one comorbidity.

As for the distribution of the reasons for hospitalization described according to the hospitalization criteria of the Brazilian National Ministry of Health, it was observed that the reason for hospitalization for half of the patients was that their health status did not allow for outpatient treatment (Table 1). Poor health status was defined by the physicians who admitted the patients, and part of the patients presented, at admission, more than one reason for hospitalization.

Of the selected patients, 212 (47%) had been previously treated, and 73.6% of the patients were under retreatment after abandonment and non-recurrence. (Table 2)

The signs and symptoms mentioned by the patients at admission as the reason for seeking medical treatment were, in order of frequency, weight loss, fever and productive cough (Table 3).

Of the 451 studied patients, 273 (60.5%) presented comorbidities; AIDS, hepatitis (without a distinction between viral and drug-induced hepatitis) and diabetes mellitus being the most frequently observed (Table 4).

Of the patients presenting productive cough at admission (Table 5), 44.6% presented positive sputum smear microscopy; 18% presented negative sputum smear microscopy; and 28.7% were not submitted to sputum smear microscopy. Of the 122 patients who were submitted to sputum smear microscopy and for whom the results were known, 87 (71.0%) presented positive results.

As for the outcome of the treatment at the HESM, we observed the following: 65.8% of the patients were referred to the MHDs or to other hospitals to continue the treatment; 18.4% of the patients died; and 9.8% of the patients were cured during hospitalization (7.1% without confirmation and 2.7% with confirmation). Discharge against medical advice occurred in 6% of the cases, 5.3% upon request and 0.7% due to administrative error.

## Discussion

As observed in patients hospitalized between 1981 and 1997 in the state of São Paulo, Brazil,[6] TB has always been described as being more prevalent in men. One group of authors stated that male patients have a 1.6 times greater chance of being hospitalized than do female patients.[7] It has been noted that men develop

**Table 5 -** Distribution of inpatients with productive cough, according to the sputum smear microscopy results at admission, at the State Hospital of Santa Maria, Rio de Janeiro, 2002/2003.

| Sputum smear microscopy | n | % |
|---|---|---|
| Positive | 87 | 44.6 |
| Negative | 35 | 18.0 |
| Not requested | 56 | 28.7 |
| Other[a] | 17 | 8.7 |
| Total | 195 | 100.0 |

[a]Cases were included in the category "Other" when no material was provided (n = 6), when the quantity of material was insufficient (n = 5) and when the results were not recorded in the charts (n = 6).

TB in a greater proportion than do women, and that this distribution is seen in developing and developed countries alike.[8] The greater occurrence of TB in younger women is in accordance with the findings of various authors.[6,7,9,10]

The distribution of the place of residence of the TB patients found in the HESM reproduces that reported for the state of Rio de Janeiro regarding the rates of TB incidence and reporting.[11] This distribution is in accordance with the characteristics classically related to the finding of a larger number of TB cases,[8] since the population density is greater in the aforementioned regions. It is of note that 97.0% of the population of the state of Rio de Janeiro resides in the urban area.[12]

A study carried out in the state of São Paulo between 1981 and 1995[6] revealed that, among the leading reasons for hospitalization, the most frequently observed was poor health status (since these patients were in an advanced phase of the disease and had severe complications at the time of their referral), followed by wasting, which demonstrates not only an advanced degree of TB but also precarious social conditions. Similar results were obtained in the present study, demonstrating the poor quality of the TB control interventions in a large metropolitan area, characterized by delayed diagnosis, limited access to treatment or a lack of knowledge on the part of the population regarding the signs and symptoms of TB.

The characterization of poor health status, which justifies the hospitalization and the standardization of the social recommendation criteria for hospitalization among medical professionals (who are responsible for the admission and discharge procedures), is highly relevant for optimizing the use of beds in referral hospitals.

The comorbidity most frequently reported was AIDS (in 30.4%). This high proportion can be a result of the fact that, during the study period, approximately 30.0% of the beds in the HESM were dedicated to the treatment of patients presenting TB/HIV coinfection. In addition, an increasing frequency of TB/HIV patients is expected in hospitals specializing in TB in regions where there is a progressive increase of HIV infection among TB patients, as reported by other authors.[13] In a previous study,[14] it was demonstrated that, among the TB cases reported in the city of Rio de Janeiro, seropositivity for the HIV was greater in hospitals (16.9%) than in the MHDs (9.2%). In the international literature, we also noticed this tendency toward an increase in the demand for hospitalizations related to the emergence of AIDS, in developed and developing countries alike.[15-17] Although most hospitalizations are based on clinical aspects, social causes of admission were identified in 28.8% of the patients. This significant percentage shows a need for different strategies for this population, which include a strong social assistance apparatus, or even for identified referrals for the continuity of the treatment, discontinuing the clinical indication for hospitalization.

Hepatitis was the second most frequently observed comorbidity (identified in 15.8%). The analysis of this variable was impaired by the fact that the charts did not distinguish between cases of drug-induced hepatitis and cases of viral hepatitis. Using the data found in the HESM Laboratory of Clinical Pathology, it was possible to determine that only 5 patients (11.6%) presented seropositivity for viral hepatitis, which leads us to the conclusion that most patients presented drug-induced hepatitis. These results are similar to those reported in other case series conducted in Brazil and in other countries.[13,18,19] Based on these data, we understand that greater attention must be paid to the investigation of asymptomatic viral infections due to the hepatitis B and C viruses, since, with the use of isoniazid, such infections can become clinically relevant.

In our sample, the prevalence of diabetes mellitus (15.4%) was also higher than that reported in the literature. One study conducted among inpatients of the La Fe Hospital, in

Valencia, Spain,[9] demonstrated that 7.4% of the TB patients also presented diabetes. In another study, conducted in the Republic of Cameroon, there were 7.1% of cases of diabetes among the TB inpatients.[20] It is likely that the high proportion of diabetic patients results from the fact that TB and diabetes co-occur more often in Brazil or that the evolution in TB treatment is less favorable in places where there is poor interaction between the TB control programs and the chronic diseases programs, which describes the scenario in the state of Rio de Janeiro.[21]

The high proportion of comorbidities observed in our sample underscores the need for adjustments at the hospitals specializing in TB, in order to treat such patients more effectively.

It is of note that, among signs and symptoms reported, weight loss was the most common, since this happens gradually, progressively and slowly in most cases, as well as being characteristic of hospitalized patients in the advanced phases of the disease. However, different findings have been reported in industrialized countries. In a study conducted in one hospital in Italy, the symptom combinations most frequently reported were as follows: fever, weight loss and cough or fever; and cough and dyspnea.[22]

In the present study, dyspnea was reported at admission by 133 patients (29.5%), 22 (16.5%) of whom evolved to respiratory failure and required mechanical ventilation. Of those 22, 20 (90.9%) evolved to death. These data show the urgent need for TB referral hospitals to have appropriate infrastructure for intensive or semi-intensive care. The low proportion of cases of hemoptysis (6.8%) observed in this sample results from the fact that patients with *ab initio* information of voluminous hemoptysis are not hospitalized in the HESM due to the lack of conditions for surgical treatment or intensive care.

We observed that, in addition to health status not allowing outpatient treatment, some other serious clinical situations, such as severe TB complications and severe clinical and surgical complications combined, were responsible for 65% of the hospitalizations. This, taken together with the fact that approximately 30% of the patients reported dyspnea at admission, underscores the fact that hospitals specializing in TB must be better equipped, and that the clinical staff must be better trained to treat critically ill patients.

Of the 122 patients who were submitted to sputum smear microscopy and for whom the results were known, 87 (71.0%) tested positive, a result similar to that reported by another group of authors.[23] In the present study, it was impossible to clarify the reasons for the lack of requests for sputum smear microscopy at admission. Also relevant was the fact that 76 patients (16.8%) reported dry cough and had been diagnosed based on clinical and radiological findings alone. Since 2004, induced sputum examination has been included in the routine diagnosis of pulmonary TB, as proposed in the literature for patients without spontaneous expectoration.[24]

The sputum smear microscopy yield obtained in our sample was higher than that reported at primary health care facilities in the city of Rio de Janeiro.[25] Efforts are constantly underway to increase professional training and improve hospital laboratories, and such efforts might have contributed to increasing the quality of the results.

Previous TB treatment, as well as, in particular, abandonment or poor compliance with treatment, is classically related to a greater possibility of developing secondary or acquired resistance.[26] Studies in hospitals in the state of Rio de Janeiro have shown resistance rates in the population treated in hospitals are higher than those found in the population treated in the primary care system. Recently, in a study on anti-TB drug resistance conducted in 595 patients treated in six hospitals in the state of Rio de Janeiro between 2004 and 2006, a high prevalence of primary MDR-TB (3.9%) was observed among 433 patients without a history of previous treatment. In the multivariate analysis, hospitals specializing in TB presented significantly higher rates of resistance and MDR than other hospitals did ($p < 0.00001$). In the two referral hospitals analyzed, the primary MDR-TB rate was higher than 8.8%.[27]

In the studied period, it was impossible to analyze the outcome of the treatment of these patients, since there was no hospitalization routine to control the system of referral and counter-referral along with the MHDs or hospitals. These data underscore the need to enable referral and counter-referral activities through pacts with municipal and state managers, preferably with the participation of the civil society, in order to promote a civil policy rather than

a governmental one. Patient transfer to other hospitals became necessary in cases of severe patients or surgical patients, since the resolution capability of the HESM had been expended due to the fact that the hospital has no functioning intensive care unit or operating room.

We can observe that the death rates obtained in this study (18.4%) are higher than those observed in the state of Rio de Janeiro and in Brazil as a whole, where the occurrence of death in the MHDs was, respectively, 5.0% and 7.0% in 2002 and 6.9% and 7.0% in 2003.[11] In the southeast region of Brazil, 80.9% of the deaths due to TB occur in hospitals. These data indicate the severity of the clinical status of these patients, as well as the need for urgent review of the infrastructure of the hospitals and the quality of the human resources with which these patients, most of whom are in severe clinical condition, are treated. However, our study did not aim at detailing the profile of the patients who died.

The data presented in our study show that the participation of the referral hospitals with beds reserved for TB cases is highly relevant for TB control, principally in metropolitan regions in developing countries. However, we observed that there is the need to change the profile of these hospitals, which, in addition to adopting biosafety measures, must be equipped with mycobacteriology laboratories and intensive or semi-intensive care units to treat a clientele that evolves to life-threatening clinical situations, with or without MDR-TB. These hospitals must also be able to rely on a health care team trained in treating patients with TB accompanied by diabetes mellitus, AIDS, alcoholism, mental illness and social problems, in addition to carrying out TB control activities in accordance with the guidelines of the city or state TB control programs with the effective participation of the civil society. The present study has already prompted operational and administrative changes at our institution.

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