

ANALYSIS OF THE MOVEMENTS OF PEOPLE DEPRIVED OF LIBERTY AND THEIR POSSIBLE INFLUENCES ON THE SPREAD OF TUBERCULOSIS

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Abstract: Introduction: Tuberculosis (TB) is a disease with a major impact in Brazil and the world. The Population Deprived of Liberty (PPL) is one of the subpopulations at high risk for infection. **Goal:** The present study aims to analyze the influence of PPL movements on the occurrence of tuberculosis in Mato Grosso do Sul (MS). **Methodology:** This is an observational, ecological study. Three databases were analyzed: 1) List of patients with active TB within the MS prison system, from January 2014 to May 2019 (N=411), obtained from the project "The spatial scale of M. tuberculosis transmission in high-incidence environments". 2) Consultation of incarceration movements in individual records in the Integrated System (SIAPEN), locating the movements of 334 patients within the prison. 3) Survey of the proportion of new cases per year, on the Integrated Health Surveillance platform of the Ministry of Health. The information was recorded in the Red Cap®. **Results.** A total of 7291 movements were obtained from 2014 to December 2018. The highest peak in movements was recorded in 2015 (1560), which coincides with the increase in the proportion of new TB cases in the same year (19.07%), compared to 2014 (7.23%). There was a drop in the number analyzed during subsequent years, followed by a new increase in movements in 2018 (1511). Regarding the proportion of new TB cases among the PPL, there was relative stability between 2015 and 2017, followed by an increase in 2018 (30.17%). **Conclusions:** It is possible that there is a relationship between the increase in new cases of TB among PPL, in the years 2015 and 2018, compared to the increase in the number of movements of individuals within the prison system in the same period. These findings can contribute to a survey of hypotheses about the extravasation of tuberculosis due to the wide network of contacts.

Keywords: tuberculosis, prisons, movements.

INTRODUCTION

Tuberculosis (TB) is an infectious disease with a major impact in Brazil and the world, being of interest to many health organizations, such as the World Health Organization (WHO) at an international level, and the Unified Health System (SUS) a Nacional level.

In 2019, approximately 10 million people fell ill from TB and approximately 1.4 million people died (WORLD HEALTH ORGANIZATION, 2020). Due to such relevance, the United Nations (UN) established the goal of reducing the incidence of TB by 90% by 2035, compared to 2015 (WORLD HEALTH ORGANIZATION, 2020).

Brazil is one of the 30 countries with a high TB burden, according to the World Health Organization, and is considered a priority for controlling the disease, being responsible for the increase in the incidence of TB on the American continent, due to an upward trend in the country since 2016 (WORLD HEALTH ORGANIZATION, 2022).

An average of 71 thousand cases of TB were diagnosed in Brazil in the last 10 years, with an incidence of 10.0 to 74.7 cases per 100 thousand inhabitants and, in 2016, 4,483 deaths were reported, representing 2.2 deaths per 100,000 inhabitants (BRAZIL, 2019).

The state of Mato Grosso do Sul is in second place, in the Central-West region, in number of new cases of pulmonary TB ($n = 900$) and in incidence per 100 thousand inhabitants ($n = 32.0\%$), behind only from Mato Grosso in the Ministry of Health indicators for the year 2021 (BRAZIL, 2021).

The Population Deprived of Liberty (PPL) is one of the subpopulations at high risk for tuberculosis (TB) infection. Several studies already indicate that PPL, due to its great vulnerability, has a high incidence of active disease compared to the general population

in various parts of the world (LAROUZÉ, 2015; PELISSARI et al., 2018). In Brazil, the fourth largest prison population in the world, the incidence of TB among PPL is up to 20 times higher ($> 1,000$ per 100,000 versus 46 per 100,000) (CARBONE et al., 2015).

The high incidence of tuberculosis in prisons contributes to a high rate of TB transmission also among guards, healthcare professionals and all people who attend prisons (BRAZIL, 2019). Furthermore, the prisoner's mobility within the system increases this risk, since, during the sentence, he moves between different institutions, health services and the general community, serving as a persistent reservoir for TB transmission (BRAZIL, 2019; CARBONE et al., 2015)

Recently, studies concluded that former prisoners contribute to the increase in the incidence of the disease for up to 7 years after release, which shows that the influence of incarceration on the transmission of the disease is greater than previously imagined (MABUD et al., 2019).

However, the additional role of the prison system in the spread of TB, through frequent transfers of incarcerated people within and between institutions, has not yet been analyzed.

GOAL

In view of the above, the present study aims to analyze the influence of the movements of those deprived of their liberty on the occurrence of tuberculosis in Mato Grosso do Sul.

METHODOLOGY

STUDY POPULATION AND DATA COLLECTION

Cross-sectional observational study of data collected from the study “The spatial scale of *M. tuberculosis* transmission in high-incidence environments”, approved by the ethics and research committee, CAAE: 2676613.3.1001.5160.

Patients with active tuberculosis within the prison system were selected for the study group. Subsequently, information about movements carried out in prisons will be collected through secondary data. The data was collected by the Integrated System (SIAPEN), which has information on the trajectory of each person deprived of liberty in the prison system.

B) STUDY LOCATIONS

Tuberculosis surveillance was carried out in the state of Mato Grosso do Sul, from January 2014 to May 2019, through active screening in three of the largest prisons in the state (EPJFC – Maximum Security – Campo Grande/MS, IPCG – MS and PED – Dourados/MS), as well as continuous passive surveillance focused on the state’s two largest cities, Campo Grande and Dourados, and three cities on the state’s border with Paraguay and Bolivia.

C) STUDY POPULATION AND INCLUSION CRITERIA

Patients who had active tuberculosis reported in the database and whose variables were possible for assessment were identified.

EXCLUSION CRITERIA

Participants whose TB diagnosis was ruled out after medical evaluation and those without registration in SIAPEN were excluded.

CASE DEFINITION

For this study, the TB case definition criterion is used, through clinical and bacteriological diagnosis: an individual who presents classic symptoms, such as persistent dry or productive cough, afternoon fever, night sweats and weight loss, or signs and manifestations radiological tests (BRAZIL, 2019).

Positive bacteriological results confirm active tuberculosis in patients with a clinical picture suggestive of TB and in respiratory symptomatic patients identified through active search (BRAZIL, 2019).

DATA COLLECTION AND ANALYSIS

Data were collected in a specific instrument containing sociodemographic characteristics, place and time of incarceration and mobility between cells, blocks and prison units.

RESULTS

We manually consulted the individual incarceration records of 411 tuberculosis patients and located movement records within prison for 334 individuals, whose information was recorded in Research Electronic Data Capture (Red Cap®), including a total of 12,891 movements.

Individuals were transferred a median of 28 times (range: 1-165), including all types of movements (between cells, blocks and prison units).

The median duration between movements was 18 days (range: 1-2247 days) after 2013, when cell-level information was recorded more consistently.

Among the total number of movements, the number of annual movements was analyzed and those that occurred from January 2014 to December 2018 were selected, in order to establish a relationship with the annual incidence of TB among PPL in the years 2014 to 2018. The information described in figure 1 was found.

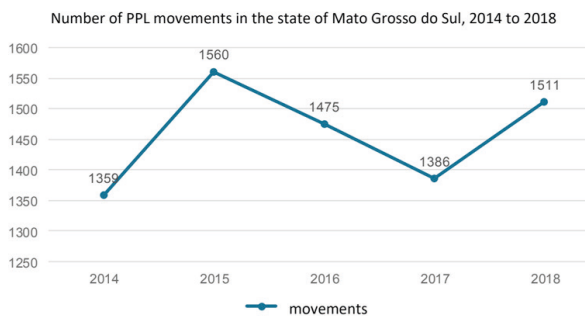


Figure 1

Source: own elaboration

According to data obtained by the Integrated Health Surveillance Platform, from the Ministry of Health, there was a significant increase in new cases of TB among the PPL, between 2014 and 2018, going from 7.23 in 2014 to 30.17 new cases, out of total new TB cases (x100), in 2018. These values are described in figure 2.

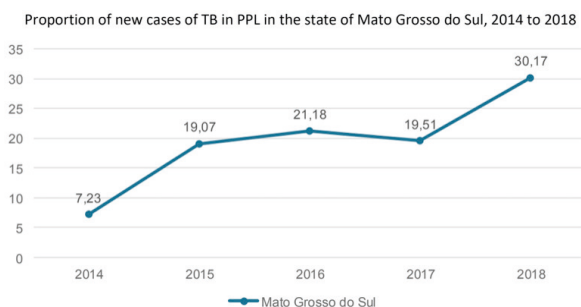


Figure 2

Source: own elaboration

Regarding the number of PPL movements from 2014 to 2018, a peak in movements was observed in 2015, which coincides with the significant increase in new TB cases in the same year, compared to 2014. There was a drop in the number analyzed, during subsequent years, followed by a further increase in the

number of movements, in 2018. Regarding the proportion of new TB cases among the PPL, relative stability was observed between 2015 and 2017, followed by a significant increase in 2018.

Given this, it is possible that there is a correlation between the increase in new cases of TB among PPL, in the years 2015 and 2018, compared to the increase in the number of movements of individuals in the prison system in the same period.

These data corroborate the hypothesis that the prisoner's mobility in the prison system influences the transmission of TB, both in the prison environment and to the general population.

CONCLUSIONS

Prisons are already recognized as high-risk environments for TB in the scientific community, but there is little data on the potential transmission of the disease within the prison system and to the community.

New studies are needed on the spatial dissemination capacity of *Mycobacterium tuberculosis* in the prison system to establish the real impact of prisoner movement on the transmission of the disease. However, the information obtained by this study highlights the correlation between the increase in PPL movements in the prison system and the increase in new cases of TB among this same population.

Therefore, the present study, through the analysis of PPL movements in the occurrence of TB in prison units, can be a tool to help plan more effective actions that prevent the spread of the disease inside and outside prison units.

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