Factors associated with death due to tuberculosis/HIV co-infection in the prison system

Fatores associados ao óbito pela coinfecção tuberculose/HIV no sistema prisional

Factores asociados al fallecimiento por coinfección tuberculosis/VIH en el sistema penitenciario

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Abstract

Objective: to analyze the factors associated with deaths due to tuberculosis/HIV co-infection in people deprived of their freedom.

Methods: Retrospective cohort study, carried out in the state of São Paulo from 2008 to 2017. The study population was made up of people with tuberculosis/HIV co-infection in deprivation of their freedom. Data were collected from the TB-WEB Tuberculosis Patient Control System in linkage with the Mortality Information System. The risk of death according to sociodemographic, clinical and treatment variables was established by relative risk and respective 95% confidence intervals.

Results: 100 deaths from tuberculosis and/or HIV were identified in the period, which were associated with: individuals belonging to the Regional Coordination of Vale do Paraíba/in the coast (relative risk 2.59; 95% confidence interval 1.35-4, 94); age groups 30 to 39 years old (relative risk 2.49; 95% confidence interval 1.04-5.96), 40 to 49 years old (relative risk 7.09; 95% confidence interval 3.06-19, 06) and 50 to 59 years old (relative risk 14.11; 95% confidence interval 5.91-33.69); self-administered treatment (relative risk 1.94; 95% confidence interval 1.16-3.27); and occurrence of hospitalization (relative risk 2.62; 95% confidence interval 1.69-4.07).

Conclusion: Such factors must be considered when dealing with tuberculosis/HIV co-infection, considering the age of people in prison, the conditions of incarceration and the intensification of directly observed treatment, aiming to avoid conditions that will require hospitalization.

Resumo

Objetivo: Analisar os fatores associados aos óbitos por coinfecção tuberculose/HIV em pessoas privadas de liberdade.

Métodos: Estudo de coorte retrospectiva, realizado no estado de São Paulo no período de 2008 a 2017. A população de estudo foi composta pelas pessoas com coinfecção tuberculose/HIV em privação de liberdade. Os dados foram coletados do Sistema de Controle de Pacientes com Tuberculose TB-WEB em *linkage* com o Sistema de Informação Sobre Mortalidade. O risco de ocorrência do óbito segundo as variáveis sociodemográficas, clínicas e de tratamento foi estabelecido pelo risco relativo e respectivos intervalos de confiança 95%.

Resultados: Foram identificados 100 óbitos por tuberculose e/ou HIV no período, os quais estiveram associados a: indivíduos pertencentes à Coordenadoria Regional do Vale do Paraíba/Litoral (risco relativo 2,59; intervalo de confiança 95% 1,35-4,94); faixas etárias de 30 a 39 anos (risco relativo 2,49; intervalo de confiança 95% 1,04-5,96), 40 a 49 anos (risco relativo 7,09; intervalo de confiança 95% 3,06-19,06) e

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50 a 59 anos (risco relativo 14,11; intervalo de confiança 95% 5,91-33,69); tratamento autoadministrado (risco relativo 1,94; intervalo de confiança 95% 1,16-3,27); ocorrência de internação (risco relativo 2,62; intervalo de confiança 95% 1,69-4,07).

Conclusão: Tais fatores devem ser considerados no enfrentamento da coinfecção de tuberculose/HIV, considerando as idade das pessoas privadas de liberdade, as condições do encarceramento e a intensificação do tratamento diretamente observado, visando evitar quadros que necessitem de internação.

Resumen

Objetivo: Analizar los factores asociados a los fallecimientos por coinfección tuberculosis/VIH en personas privadas de la libertad.

Métodos: Estudio de cohorte retrospectiva, realizado en el estado de São Paulo durante el período de 2008 a 2017. La población del estudio estuvo compuesta por personas con coinfección tuberculosis/VIH privadas de la libertad. Los datos fueron recopilados del Sistema de Control de Pacientes con Tuberculosis TB-WEB, conectado con el Sistema de Información sobre Mortalidad. El riesgo de casos de fallecimiento según variables sociodemográficas, clínicas y de tratamiento se estableció por el riesgo relativo y respectivos intervalos de confianza 95 %.

Resultados: Se identificaron 100 muertes por tuberculosis o VIH en el período, las cuales se asociaron a los siguientes factores: individuos pertenecientes a la Coordinación Regional de Vale do Paraíba/Litoral (riesgo relativo 2,59; intervalo de confianza 95 % 1,35-4,94); grupo de edad de 30 a 39 años (riesgo relativo 2,49; intervalo de confianza 95 % 1,04-5,96), de 40 a 49 años (riesgo relativo 7,09; intervalo de confianza 95 % 3,06-19,06) y de 50 a 59 años (riesgo relativo 14,11; intervalo de confianza 95 % 5,91-33,69); tratamiento autoadministrado (riesgo relativo 1,94; intervalo de confianza 95 % 1,16-3,27), y casos de internación (riesgo relativo 2,62; intervalo de confianza 95 % 1,69-4,07).

Conclusión: Estos factores deben considerarse en el enfrentamiento de la coinfección de tuberculosis/VIH, considerando la edad de las personas privadas de la libertad, las condiciones del encarcelamiento y la intensificación del tratamiento directamente observado, con el objetivo de evitar cuadros que necesiten internación.

Introduction

In the mid-1980s, the first cases of infection with the human immunodeficiency virus (HIV) were reported and, even after three decades, the infection remains a major challenge for public health. It is estimated that 39 million people were living with the infection in 2022, with five thousand new cases being diagnosed daily. Furthermore, since its emergence, approximately 40.4 million people have died from HIV-related diseases.[1]

As for tuberculosis (TB), it is estimated that 10 million people develop the disease each year, and that, in 2018, 1.2 million individuals died due to TB.[2] HIV infection increases approximately 28 times the chance of developing TB[3] and this disease, in turn, is responsible for one in three HIV-related deaths.[4]

The chances of contracting HIV are increased in so-called key populations, which, due to specific legal and social issues, may find themselves in a vulnerable situation. Among the key populations for HIV infection, the population deprived of freedom (PDF) stands out, which is also considered a population at high risk for developing TB.[5,6]

It is estimated that the prevalence of HIV and TB in PDF is approximately 10 times greater than in the general population and that the risk of developing TB is 28 times greater.[5] The immunological status of people living with HIV, the The environment in which they are inserted and exposure to the TB bacillus represent a triad of weaknesses found in prison systems for the occurrence of TB/HIV co-infection.[7]

In this sense, prison health units must be responsible for offering actions aimed at screening, early diagnosis and timely treatment for HIV and TB, in order to minimize unfavorable outcomes, such as death.[8,9]

On a global scale, Brazil has the third largest PDF in the world, behind the United States and China, in addition to having an occupancy rate of 161.3%,[10,11] which represents an overcrowding situation in the prison system. According to data from the Penal Information Report (Relipen), the state of São Paulo housed 30.4% of the country's prison population in 2023, with 195,787 people in custody, becoming the federated unit with the largest prison population, far below, in second place, is the state of Minas Gerais, which had 66,241 people deprived of their freedom.[12]

Literature review conducted in July 2020, which aimed to identify the factors associated with death from TB and HIV/AIDS in the prison system, even though a broad search was carried out in seven databases and without delimiting the publication period, it was noticed that the studies dealt with the aforementioned health conditions in isolation, without investigating TB/HIV co-infection.[13]

Therefore, considering the gap in knowledge regarding the proposed topic and resuming the epidemiological situation of TB and HIV in prison settings, which act as synergistic conditions for the occurrence of death, this study seeks to analyze the factors associated with deaths due to co-infection by TB/HIV in people deprived of freedom.

Methods

This is a retrospective cohort, carried out in the state of São Paulo with cases of TB/HIV co-infection diagnosed between 2008 and 2017. São Paulo, in 2018, presented 2246 notifications of Tuberculosis and 3145 notifications of HIV among people deprived of freedom.[14]

The study population consisted of people diagnosed with TB/HIV co-infection in custody in the prison system of the state of São Paulo. To identify deaths involving TB or HIV among the study population, a probabilistic linkage was made between the databases of the Tuberculosis Patient Control System (TB-WEB) and the Mortality Information System (MIS). Therefore, deaths from causes not identified as TB or HIV were excluded from the study, in addition to those occurring 30 days or more after the case was closed. Such cases were excluded because we understood that they were not TB/HIV co-infection.

Cases of TB/HIV co-infection whose treatment termination was recorded as a cure in TB-WEB constituted the death comparison group, however, there was no concern with the pairing of study participants, since all cases diagnosed in the period were included. studied and which progressed to death and cure.

Data analysis was initially carried out using frequency distribution, using Statistica software from Statsoft. The relative risk (RR) and respective confidence intervals were calculated to analyze the risk of death (dependent variable) according to sociodemographic, clinical and treatment variables (independent variables). For this, a significance level of 5% was adopted, using the R/RStudio program version 1.2.5033.

This research was approved by the Ethics Committee of the Ribeirão Preto School of Nursing from the Universidade de São Paulo, according to opinion number 3.266.450 and Certificate of Presentation of Ethical Appreciation (CAAE): 04484818.0.3001.5375.

Results

During the period studied (2008 to 2017), 312 deaths were identified among the PDF that had TB/HIV co-infection reported in TB-WEB after linking this database with the SIM. Among the total number of deaths, 181 people died one month after ending TB treatment and 31 people, whose deaths were not related to TB or HIV, were excluded. In this way, we could identify 100 deaths whose basic causes for death were related to TB or HIV. In the same period, 1,262 people with TB/HIV co-infection were cured of TB. An association with death due to TB/HIV co-infection was identified in people deprived of freedom linked to the Regional Coordination of Penitentiary Units of Vale do Paraíba/in the coast (RR 2.59; 95% CI 1.35-4.94) compared to those linked to the West Management. Furthermore, people aged 30 to 39 years old (RR 2.49; 95%CI 1.04-5.96), 40 to 49 years old (RR 7.09; 95%CI 3.06-19.06) and 50 to 59 years old (RR 14.11; 95%CI 5.91-33.69) had a higher risk of death when compared to those in the age group 19 to 29 years old. Gender, race/color and years of education were not factors associated with death (Table 1).

People undergoing self-administered treatment had a 1.94 (95% CI 1.16-3.27) times greater risk of dying compared to those who underwent directly observed treatment (DOT). Furthermore, a higher risk of death was identified among those who required hospitalization (RR 2.62; 95%CI 1.69-4.07). Type of case, clinical form, diabetes, mental disorder, smoking, alcoholism and drug use were not risk factors for death (Table 2).

Table 1. Sociodemographic factors associated with deaths due to tuberculosis/HIV co-infection in people deprived of freedom

Variables		Death n (%)	Cure n (%)	RR (CI95%)
Management	West	18(18.0)	304(24.1)	1
	Vale do Paraíba/Coast	15(15.0)	89(7.1)	2.50(1.35-4.94)
	Capital/Greater São Paulo	37(37.0)	466(36.9)	1.32(0.76-2.27)
	Central	11(11.0)	191(15.1)	0.97(0.47-2.02)
	Northwest	19(19.0)	212(16.8)	1.47(0.79-2.74)
Gender	Female	8(8.0)	73(5.8)	1
	Male	92(92.0)	1189(94.2)	0.72(0.36-1.43)
Age group (years)	19-29	6(6.0)	321(25.4)	1
	30-39	28(28.0)	584(46.3)	2.49(1.04-5.96)
	40-49	44(44.0)	294(23.3)	7.09(3.06-19.06)
	50-59	22(22.0)	63(5.0)	14.11(5.91-33.69)
Race/Color*	White/Yellow	42(54.5)	503(48.6)	1
	brown	29(37.7)	405(39.1)	0.87(0.55-1.37)
	Black	6(7.8)	127(12.3)	0.59(0.25-1.35)
Years of study*	None	-	16(1.8)	-
	1 a 3	11(18.6)	126(14.4)	1.12(0.26-4.80)
	4 a 7	27(45.8)	448(51.3)	0.80(0.20-3.18)
	8 a 11	19(32.2)	257(29.4)	0.96(0.24-3.92)
	12 a 14	2(3.4)	26(3.0)	1

*n differs depending on blank/ignored data

Table 2. Clinical and treatment-related factors associated with deaths due to tuberculosis/HIV co-infection in people deprived of freedom

Variables		Death n(%)	Cure n(%)	RR (CI95%)
Case type	new case	66(66.0)	774(61.3)	1
	Recurrence	28(28.0)	328(26.0)	1.00(0.65-1.53)
	Retreatment after abandonment	6(6.0)	141(11.2)	0.52(0.23-1.18)
	Bankruptcy/resistance	0	19(1.5)	-
Clinical form	Pulmonary	70(70.0)	984(78.0)	1
	Extrapulmonary	18(18.0)	188(14.9)	1.32(0.80-2.16)
	Pulmonary + Extrapulmonary	12(12.0)	90(7.1)	1.77(0.99-3.16)
Diabetes	Yes	1(1.0)	12(1.0)	1.05(0.16-6.96)
	No	99(99.0)	1250(99.0)	1
Mental disorder	Yes	-	16(1.3)	-
	No	100(100)	1246(98.7)	1
Smoking	Yes	6(6.0)	116(9.2)	0.65(0.29-1.45)
	No	94(94.0)	1146(90.8)	1
Alcoholism	Yes	9(9.0)	97(7.7)	1.17(0.61-2.26)
	No	91(91.0)	1165(92.3)	1
Use of drugs	Yes	15(15.0)	190(15.1)	1.00(0.59-1.69)
	No	85(85.0)	1072(84.9)	1
Directly observed treatment*	Yes	64(80.0)	1025(89.2)	1
	No	16(20.0)	124(10.8)	1.94(1.16-3.27)
Hospitalization	Yes	75(75.0)	652(51.7)	2.62(1.69-4.07)
	No	25(25.0)	610(48.3)	1

*n differs depending on blank/ignored data

Discussion

This study allows us to understand the factors associated with death due to TB/HIV co-infection in the prison system of the state of São Paulo, by pointing out that such an unfavorable outcome was present in an economically active age group, as well as intrinsically related to elements that may reflect unequal access health, such as the location of custody units, the treatment regimen used for TB and the need for hospitalization due to a possible exacerbation of TB and/or HIV.

According to the Brazilian Penal Execution Law (LEP) Number 7,210/1984, it is the State's obligation to promote the protection of those who are deprived of freedom and guarantee their fundamental rights in relation to judicial, security or health issues.[15] Furthermore, comprehensive health care for this population is based on the National Policy for Comprehensive Health Care for the Prison Population (NPCHCPP), which must guarantee effective and systematic access to health actions in prison units authorized by the Unified Health System.[16]

In this sense, death due to two preventable, treatable and, in the case of TB, curable conditions, from a social perspective in prison environments, can be characterized as collective social and/or political violence due to the absence or neglect of the State's role in relation to the right and access to health.[17] Furthermore, it may reflect a context of erasure of public policies by a State that should reinforce the sense of citizenship, guarantee rights and reduce social inequalities and inequities in health.[18]

In these environments, the occurrence of TB/HIV co-infection is influenced by unsanitary conditions, overcrowding, inadequate ventilation, in addition to the precarious supply of human resources, administrative, political and judicial processes that weaken the articulation between the health, justice and security system.[19,20] For the state of São Paulo, it is identified that the provision of health actions on TB and HIV to PDF occurs heterogeneously among prison health coordinators.[21]

From this, the death associated with the Regional Coordination from Vale do Paraíba/in

the coast may indicate weaknesses in resources and processes, since the prison units belonging to this coordination have a high percentage of Provisional Detention Centers, which suggests that assistance to health appears to be directed at the moment of admission of individuals into custody. Furthermore, according to a study carried out in prison units in the state of São Paulo in the period 2016 and 2018, the coordination in question had a smaller number of health professionals when compared to the other regional coordinators in the state, being the only one without the presence of social worker and laboratory technician.[21] Furthermore, this coordination had a lower proportion of cases under DOT and Antiretroviral Therapy (ART), which should be offered to all people living with HIV.[21] Such aspects can contribute in the overlap of pre-existing social vulnerabilities, in the late diagnosis of cases and, consequently, contributing to the unfavorable outcome of the treatment of both conditions.

Individual characteristics, such as gender, have a great capacity to influence health outcomes.[22] However, in this study, there was a high percentage of male people both among the cases that died and among the cases that recovered. This result may be a reflection of the high number of males in the prison system, as well as the epidemiological characteristic of TB and HIV affecting more men than women.[23]

When analyzing the age group, it was found that the risk of death increased proportionally to increasing age, which may indicate the overlap of chronic conditions throughout people's lives, which increase the severity and complexity of case management. The pattern of deaths from TB among adults of working age brings reflections regarding the implementation of health rights still in force within the prison system, due to the worsening of health conditions and mortality of these people.[13,18]

Regarding race/skin color, a study carried out with the population of a hospital in Rio de Janeiro indicated that non-white people were 1.6 times more likely to have an unfavorable outcome due to TB.[24] In the general population, In this same study, the outcome death from TB was also associated with the predominance of low education, resulting in unfavorable living conditions and, consequently, greater vulnerability to TB/HIV co-infection. Such results can be explained by inequities in the provision of health services and the high socioeconomic inequality involving the general population. However, this difference in the association of death according to racial groups and education was not identified in the population deprived of freedom in the present study.

The clinical form of TB was not a factor associated with death among people deprived of freedom, even considering the fact that prison units have incompatible technological density for the diagnosis and management of extrapulmonary cases, which are more common among people who live with HIV, due to the hematogenous dissemination of the bacillus in individuals with immunosuppression.[25]

Regarding associated comorbidities, no association was identified between deaths due to TB/HIV co-infection with diabetes mellitus, mental disorders and drug use, both legal and illicit. However, a literature review showed that such comorbidities were associated with death in the general population of different countries,[26] showing that the evolution of the disease may differ depending on the type of population affected.

Regarding treatment characteristics, there was a higher risk of death among people deprived of their freedom who were undergoing self-administered treatment for TB. In this sense, it is important to highlight the need to implement DOT in the prison context, as a strategy for adherence to TB treatment and, consequently, reducing the transmission chain, treatment abandonment and death. However, care management in the prison system presents challenges for carrying out DOT, such as the shortage of health and security professionals out of step with the high number of people deprived of freedom.[27]

Furthermore, it was identified that individuals who required hospitalization at some point during the treatment of TB/HIV co-infection were at greater risk of death. In the prison context, it is understood that the need for hospitalization among people affected by TB and HIV can signal weaknesses in the active case search process and late diagnosis of one or both diseases, which can worsen

the health situation and, in some cases, affect the occurrence of a cure for TB and the continuity of HIV treatment.[28]

Considering that such an event could be avoidable, the results of this study indicate that hospitalization may also be linked to exacerbated number of cases of TB and HIV, which may have evolved with greater severity and the possibility of death. This highlights the need for tracking TB and HIV cases among PDF, in addition to establishing treatment for latent TB among those with HIV and on ART, in order to reduce the incidence of TB, morbidity and mortality.[28]

Furthermore, the chronicity of HIV cases, which may no longer respond to treatment after long years of the illness[29] increases the risk of worsening and the occurrence of death as the outcome, revealing the need to incorporate the unique follow-up of these people depending on their health profiles, risk and the inclusion of strategies that could promote supported self-care and monitoring the regularity of use and adherence to treatment for both TB and HIV.[13]

To this end, it is essential to strengthen and integrate the health programs of the prison system with regard to the care of cases of TB and HIV co-infection, since prison units must cover the list of actions and services of Primary Care to Health, as well as ensuring referral to specialized health services for the continuity of care provided with a view to strengthening the health care network, considering prison units as points of care.

Regarding the limitations of the study, a possible information bias is considered, due to the incompleteness of the data, which were obtained from secondary sources.

Conclusion

Belonging to the Regional Coordination of Vale do Paraíba/in the Coast, age groups over 29 years old, self-administered treatment and need for hospitalization were considered factors associated with death from TB and/or HIV among people with co-infection for both health conditions, showing the need for the implementation of public policies aimed at PDF, from the perspective of risk stratification with a comprehensive and continuous approach to this population. Therefore, such factors must be considered when confronting TB/HIV co-infection from the management of health and prison services, such as improving incarceration conditions, increasing the supply of human resources, and care management, through the operationalization and intensification of the DOT, in addition to comprehensive health care for this population, aiming to avoid acute conditions that evolve into the need for hospitalization and death.

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Collaborations

Naves EF, Andrade RLP, Santos GP, Ferreira MRL, Ballestero JGA, Alencar V and Monroe AA have contributed to the design of the study, analysis and interpretation of data, writing this paper, relevant critical review of the intellectual content and approval of the final version to be published.

References

1. United Nations. Programme on HIV/AIDS (UNAIDS). Estatísticas: evolução de casos de HIV no Brasil. Brasília (DF): UNAIDS; 2023 [citado 2023 Out 2]. Disponível em: https://unaids.org.br/estatisticas/
2. World Health Organization (WHO). Global tuberculosis report 2019. Geneva: WHO; 2019 [cited 2023 Mar 6]. Available from: https://reliefweb.int/attachments/eacacd37-ae6e-3f99-8392-650a9de3f7d1/Global%20Tuberculosis%20Report%202019.pdf
3. Soares Filho MM, Bueno PM. Demography, vulnerabilities and right to health to Brazilian prison population. Cien Saude Colet. 2016;21(7):1999-2010.
4. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Manual de recomendações para o controle da tuberculose no Brasil. Brasília (DF): Ministério da Saúde; 2019 [citado 2023 Mar 6]. Disponível em: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/svsa/tuberculose/manual-de-recomendacoes-e-controle-da-ttuberculose-no-brasil-2a-ed.pdf

5. Stop TB Partnership. Global plan to end TB and key population: Prisoners. Geneva: The Stop TB Partnership; 2016 [cited 2023 Mar 6]. Available from: https://stoptb.org/assets/documents/resources/publications/acsm/kp_prisoners_spreads.pdf

6. Stop Tb Partnership. Global plan to end TB and key population: People living with HIV. Geneva: The Stop TB Partnership; 2016 [cited 2023 Mar 6]. Available from: https://stoptb.org/assets/documents/resources/publications/acsm/KPBrief_PLHIV_ENG_WEB.pdf

7. Winter BC, Garrido RG. A tuberculose no cárcere: um retrato das mazelas do sistema prisional brasileiro. Med Leg Costa Rica. 2017;34(2):20-31.

8. Silva BN, Temoteo RC, Véras GC, Silva CR. Fatores predisponentes de tuberculose em indivíduos privados de liberdade: revisão integrativa. Arch Health Sci. 2019;26(1):67–71. Review.

9. Valença MS, Cezar-Vaz MR, Brum CB, Silva PE. O processo de detecção e tratamento de casos de tuberculose em um presídio. Cien Saude Colet. 2016;21(7):2111-22.

10. World Prison Brief (WPB). International Center For Prison Studies. Institute for Criminal Policy Research. Highest to lowest: prison population total. London: WPB; 2021 [cited 2023 Mar 8]. Available from: https://www.prisonstudies.org/highest-to-lowest/prison-population-total?field_region_taxonomy_tid=All

11. Brasil. Ministério da Justiça e Segurança Pública. Departamento Penitenciário Nacional. Levantamento nacional de informações penitenciárias: período de julho a dezembro de 2019. Brasília (DF): Ministério da Justiça e Segurança Pública; 2010 [citado 2023 Mar 12]. Disponível em: https://app.powerbi.com/view?r=eyJrIjoiMmU4ODAwNTAtY2IyMS00OWJiLWE3ZTgtZGNjY2ZhNTYzZDliIiwidCI6ImViMDkwNDIwLTQ0NGMtNDNmNy05MWYyLTRiOGRhNmJmZThlMSJ9

12. Brasil. Ministério da Justiça e Segurança Pública. Secretaria Nacional de Políticas Penais. SISDEPEN: Dados Estatísticos do Sistema Prisional. Relatório de Informações Penais. 14º ciclo - período de janeiro a junho de 2023. Brasília (DF): Ministério da Justiça e Segurança Pública; 2021 [citado 2024 Jan 25]. Disponível em: https://www.gov.br/senappen/pt-br/servicos/sisdepen/relatorios/relatorios-anteriores

13. Camillo AJ, Ferreira MR, Bossonario PA, Andrade RL, Saita NM, Rezende CE, et al. Factors associated with death from tuberculosis and HIV/aids in prisons: integrative review. Acta Paul Enferm. 2022;35:eAPE01606. Review.

14. Conselho Nacional do Ministério Público (CNMP). Sistema prisional em números. Brasília (DF): CNMP; 2019 [citado 2023 Mai 7]. Disponível em: https://www.cnmp.mp.br/portal/relatoriosbi/sistema-prisional-em-numeros

15. Brasil. Presidência da República. Casa Civil. Subchefia para Assuntos Jurídicos. Lei n. 7.210, de 11 de julho de 1984. Institui a Lei de Execução Penal. Brasília (DF): Presidência da República; 1984 [citado 2023 Mai 7]. Disponível em: https://www.planalto.gov.br/ccivil_03/leis/l7210.htm

16. Brasil. Ministério da Saúde. Portaria Interministerial n. 1, de 2 de janeiro de 2014. Institui a Política Nacional de Atenção Integral à Saúde das Pessoas Privadas de Liberdade no Sistema Prisional (PNAISP) no âmbito do Sistema Único de Saúde (SUS). Brasília (DF): Ministério da Saúde; 2014 [citado 2023 Mai 7]. Disponível em: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2014/pri0001_02_01_2014.html

17. Chies LA, Almeida BR. Mortes sob custódia prisional no Brasil: prisões que matam; mortes que pouco importam. Rev Cien Soc. 2019;32(45):67–90.

18. Ferreira MR, Andrade RL, Bossonario PA, Fiorati RC, Arcêncio RA, Rezende CE, et al. Social determinants of health and unfavourable outcome of tuberculosis treatment in the prison system. Cien Saude Colet. 2022;27(12):4451-9.

19. Rich JD, Beckwith CG, Macmadu A, Marshall BD, Brinkley-Rubinstein L, Amon JJ, et al. Clinical care of incarcerated people with HIV, viral hepatitis, or tuberculosis. Lancet. 2016;388(10049):1103–14.

20. Akiyama MJ, Spaulding AC, Rich JD. Flattening the curve for incarcerated populations: COVID-19 in jails and prisons. N Engl J Med. 2020;382(22):2075–7.

21. Saita NM, Pelissari DM, Andrade RL, Bossonario PA, Faria MG, Ruffino Netto A, et al. Regional coordinators of Sao Paulo State prisons in tuberculosis and HIV coinfection care. Rev Bras Enferm. 2020;73(Suppl 6):e20190738.

22. Carrapato P, Correia P, Garcia B. Determinante da saúde no Brasil: a procura da equidade na saúde. Saude Soc. 2017;26(3):676–89.

23. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico Tuberculose 2022, número especial, março 2022. Brasília (DF): Ministério da Saúde; 2022 [citado 2023 Mar 9]. Disponível em: http://antigo.aids.gov.br/pt-br/pub/2022/boletim-epidemiologico-de-tuberculose-2022

24. Pereira AG, Escosteguy CC, Gonçalves JB, Marques MR, Brasil CM, Silva MC. Fatores associados ao óbito e ao abandono do tratamento da tuberculose em um hospital geral do município do Rio de Janeiro, 2007 a 2014. Rev Epidemiol Control Infect. 2018;8(2):150–8.

25. Raviglione M. Tuberculosis. In: Jameson JL, Fauci A, Kasper D, Hauser S, Longo D, Loscalzo J. Harrison's Principles of Internal Medicine. 20th ed. Nova York: McGraw-Hill Medical; 2018.

26. Waitt CJ, Squire SB. A systematic review of risk factors for death in adults during and after tuberculosis treatment. Int J Tuberc Lung Dis. 2011;15(7):871–85. Review.

27. Oliveira LG, Natal S, Camacho LA. Análise da implantação do Programa de Controle da Tuberculose em unidades prisionais no Brasil. Cad Saude Publica. 2015;31(3):543–54.

28. Perrechi MC, Ribeiro SA. Outcomes of tuberculosis treatment among inpatients and outpatients in the city of São Paulo, Brazil. J Bras Pneumol. 2011;37(6):783–90.

29. Cecilio HP, Santos AL, Marcon SS, Latorre MD, Mathias TA, Rossi RM. Tuberculosis mortality trend in the state of Paraná, Brazil - 1998-2012. Cien Saude Colet. 2018;23(1):241-8.