Social determinants of health associated with hospital readmissions of people with HIV

Determinantes sociais de saúde associados à reinternação hospitalar de pessoas com HIV

Determinantes sociales de la salud asociados a la reinternación hospitalaria de personas con VIH

Jéssica Karen de Oliveira Maia[1] https://orcid.org/0000-0001-9041-7149
Reângela Cíntia Rodrigues de Oliveira Lima[1] https://orcid.org/0000-0002-7989-5104
Nikaelly Pinheiro Mota[1] https://orcid.org/0000-0001-5224-446X
Juliana Cunha Maia[1] https://orcid.org/0000-0002-1982-0186
Marli Teresinha Gimeniz Galvão[1] https://orcid.org/0000-0003-3995-9107
Priscila de Souza Aquino[1] https://orcid.org/0000-0003-4976-9817

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Corresponding author
Juliana Cunha Maia
Email: julianacmaia.cunha@gmail.com

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Paula Hino
(https://orcid.org/0000-0002-1408-196X)
Escola Paulista de Enfermagem, Universidade Federal de São Paulo, São Paulo, SP, Brazil

Abstract

Objective: To assess the association between social determinants of health and occurrence of hospital readmissions of people living with HIV.

Methods: This is a cross-sectional study, with data from 262 medical records of people with HIV who were hospitalized within a 12-month period, in Fortaleza, Ceará. Medical records available in full in the hospital file were included. The outcome variable was analyzed in two ways: readmission as a dichotomous variable (yes/no) and in a multinomial way, through the number of readmissions (none, 1-2, 3 or ≥4 readmissions). P<0.05 was considered significant with a confidence level of 95%.

Results: Of the people who used illicit drugs, 63% (n=51) were readmitted, compared to 47.3% (n=71) of those who did not use them (p=0.02). There was readmission in 66.7% (n=36) of people who earned up to one minimum wage and 48% (n=71) of those who earned between one and two minimum wages. There was a percentage of 30.8% (n=12) of rehospitalization in those away from work; 41.3% (n=26) in people who were performing work activities; and 60.9% (n=70) of readmission in unemployed.

Conclusion: The individual social determinant of health related to readmissions that stood out was age ≥ 40 years. Regarding the proximal determinants, illicit drug use was more related to the readmissions recorded. The intermediate determinant with the highest evidence of rehospitalization was related to the employment situation, since unemployed individuals had a higher percentage of three or more hospitalizations. Thus, the social determinants of health with an impact on the occurrence of hospital readmissions of people living with HIV were illicit drug use, people who received less than or equal to a minimum wage and who were unemployed.

Resumo

Objetivo: Avaliar a associação entre os determinantes sociais de saúde e a ocorrência de reinternação hospitalar de pessoas vivendo com HIV.

Métodos: Estudo transversal, com dados de 262 prontuários de pessoas com HIV, que foram internadas no período de 12 meses, em Fortaleza, Ceará. Foram incluídos prontuários disponíveis na íntegra no arquivo hospitalar. A variável de desfecho foi analisada de duas formas: reinternação como variável dicotômica (sim/não) e de forma multinomial, por meio do número de reinternações (nenhuma, 1-2, 3 ou ≥4 reinternações). Foi considerado significante p<0,05 com nível de confiança de 95%.

Resultados: Das pessoas que faziam uso de drogas ilícitas, 63% (n=51) apresentavam reinternação, em comparação aos 47,3% (n=71) daqueles não faziam uso (p=0,02). Houve reinternação em 66,7% (n=36) das pessoas que recebiam até um salário mínimo e 48% (n=71) das que recebiam entre um e dois salários

[1] *Universidade Federal do Ceará, Fortaleza*, CE, Brazil.

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mínimos. Ocorreu percentual de 30,8% (n=12) de reinternação em afastados do trabalho, 41,3%; (n=26) em pessoas que estavam exercendo atividades laborais e 60,9% (n=70) de reinternação em desempregados (p=0,001).

Conclusão: O determinante social de saúde individual relacionado às reinternações que obteve destaque foi idade ≥ 40 anos; quanto aos determinantes proximais, uso de drogas ilícitas esteve mais relacionado às reinternações registradas. O determinante intermediário com maior evidência de reinternação esteve relacionado à situação de trabalho, uma vez que os desempregados apresentaram maior percentual de três ou mais internações. Assim, os determinantes sociais de saúde com impacto na ocorrência de reinternação hospitalar de pessoas vivendo com HIV, foram: uso de drogas ilícitas, pessoas que recebiam valor menor ou igual a um salário mínimo e os desempregados.

Resumen

Objetivo: Evaluar la relación entre los determinantes sociales de la salud y los episodios de reinternación hospitalaria de personas que viven con el VIH.

Métodos: Estudio transversal, con datos de 262 historias clínicas de personas con VIH que fueron internadas durante un período de 12 meses en Fortaleza, Ceará. Se incluyeron historias clínicas disponibles en su totalidad en el archivo hospitalario. La variable de resultado fue analizada de dos formas: reinternación como variable dicotómica (sí/no) y de forma multinomial, mediante el número de reinternaciones (ninguna, 1-2, 3 o ≥4 reinternaciones). Se consideró significante p<0,05, con nivel de confianza de 95 %.

Resultados: De las personas que consumían drogas ilícitas, el 63 % (n=51) presentó reinternación, comparado con el 47,3 % de los que no consumían (p=0,02). Hubo reinternación en el 66,7 % (n=36) de las personas que ganaban hasta un salario mínimo y en el 48 % (n=71) de las que ganaban entre uno y dos salarios mínimos. Se observó un porcentaje de 30,8 % (n=12) de reinternaciones en personas con licencia laboral, un 41,3 % (n=26) en personas que estaban ejerciendo actividades laborales y un 60,9 % (n=70) de reinternaciones en personas desempleadas (p=0,001).

Conclusión: El determinante social de la salud individual relacionado con las reinternaciones que predominó fue la edad ≥ 40 años. Respecto a los determinantes proximales, el consumo de drogas ilícitas se vio más relacionado con las reinternaciones registradas. El determinante intermedio con mayor evidencia de reinternación se relacionó con la situación laboral, dado que las personas desempleadas presentaron un porcentaje mayor de tres internaciones o más. De esta forma, los determinantes sociales de la salud con impacto en los episodios de reinternación hospitalaria de personas que viven con el VIH fueron: consumo de drogas ilícitas, personas que ganaban un valor menor o igual a un salario mínimo y personas desempleadas.

Introduction

The Human Immunodeficiency Virus (HIV) is an important health concern due to its pandemic nature and its high potential for severity. Of the 38 million people living with HIV (PLHIV), 25.4 million are on treatment. This means that 12.6 million people are still without access to antiretroviral therapy (ART). It is believed that factors such as violence and inequality contribute to these data and continue to drive the epidemic. Thus, these factors must be addressed to guarantee everyone, everywhere, the right to health, breaking down the social, economic and political barriers that prevent PLHIV from receiving essential care services.[1]

In Brazil, from 1980 to June 2021, 1,045,355 cases of AIDS were detected, and of the new cases of infection, the highest concentration of AIDS was observed in individuals aged between 25 and 39 years: 52.0% of male cases and 47.8% of female cases, among individuals from the 5th to the 8th incomplete grade (20.8%), where the observed proportions were 58.3% and 60.0% between black men and women black, respectively. Access to ART reduced PLHIV morbidity and mortality; however, structural difficulties in the health system combined with the COVID-19 pandemic may further compromise the effectiveness of ART distribution and provision, which can lead to complications associated with a worse prognosis of PLHIV hospitalized for causes related or not to the infection[2].

Thus, from 2010 to 2019, a total of 338,966 cases of hospitalizations due to HIV were recorded in Brazil. There was an increase in the number of hospitalizations between 2010 and 2013 (2.84%) and a gradual decrease between 2014 and 2019 (19.17%). Analyzing the number of hospitalizations according to sex, there is a predominance of occurrences in males, 216,831 cases (63.9%), with an average of 21,683 hospitalizations per year. Regarding the number of hospitalizations in relation to regime, 51.35% were in public hospitals, and 10.31%, in private hospitals. As for the character of hospitalization, the highest number was due to emergency (80.65%). Thus, statistically significant differences between these variables were demonstrated ($p < 0.001$).[2,3]

However, PLHIV's health is not restricted to treatment with ART. If this individual's social life is impaired, they can easily abandon treatment and develop a poor prognosis. Thus, it is necessary to

add greater importance to the social problems in these individuals, as they have a great influence on treatment compliance or abandonment. Added to this, the changes in the new social reality caused by the syndemic with COVID-19 are factors that can influence increase in comorbidities and readmissions of PLHIV.[4]

In this context, the importance of knowledge about the social determinants of health (SDH) is highlighted, a set of factors that characterizes individuals' particularities and reflects their insertion in time-space in different populations. Such determinants suggest that social position determines health through intermediary factors. The effect on health is indirect, through determinants arranged differently in social groups.[5]

Dahlgren and Whitehead's model arranges the SDH in concentric layers, in which individuals are at the center of the model: layer 1 (individual determinants); layer 2 (proximal determinants: individual behaviors and lifestyles); layer 3 (influence of social networks, i.e., relationships in the social sphere); layer 4 (intermediate determinants: living conditions, work, food, access to environments and essential services); layer 5 (distal determinants or macro determinants: society's economic, cultural and environmental conditions).[6]

Thus, the aforementioned model seeks to highlight the relationship between social determinants and health outcomes. Initially, there are personal behaviors and ways of life that can damage or improve health, influenced by social and community networks, contextualized by living and working conditions and access to facilities. Then there are a society's wider economic, cultural and environmental conditions, which influence all other layers. Understanding the interrelation between the levels allows the identification of points for public policy interventions.[7]

In this context, considering the number of hospitalizations of PLHIV, this study is relevant to know the main SDH for hospital rehospitalization of PLHIV. Knowledge of these determinants must consider the socioeconomic reality that interferes with the process of illness and readmissions, in order to add effective prevention measures to epidemic control actions. Thus, this study aimed to assess the association between SDH and occurrence of hospital readmissions in people with HIV.

Methods

This is a cross-sectional study developed using secondary data obtained from the physical and electronic medical records of PLHIV hospitalized in 2018 (12 months), in a reference hospital for infectious and contagious diseases and HIV treatment, in the city of Fortaleza, Ceará, Brazil and guided by the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) to report observational studies. The registration of medical diagnosis of HIV and the presence of compulsory reporting in the Notifiable Diseases Information System (SINAN - *Sistema de Informação de Agravos de Notificação*) were considered as inclusion criteria.

Medical records were collected from November 2019 to January 2020 using simple random probability sampling. For the sample calculation, we considered the records of hospital admissions (wards and ICU) due to HIV in the year prior to the survey, which totaled 829, and the finite population formula was used, considering the 95% confidence level and the 5% margin of error, resulting in a sample of 289 records.

Patients with medical records available in the hospital file, medical writing with clinical diagnosis of HIV and presence of the compulsory notification form of SINAN were included. A total of 27 unsatisfactorily completed medical records were excluded, characterized by the presence of numerous study variables with no response, resulting in 262 medical records.

An investigation was carried out in clinical records using a semi-structured form. The occurrence of rehospitalization was considered an outcome variable. As predictor variables, we considered: layer 1 - (individual determinants: age, sex, race, marital status, serological status); layer 2 - (proximal determinants: main complaint for hospitalization,

length of stay, number of hospitalizations, stay in the Intensive Care Unit (UTI), hemodialysis, mechanical ventilation, blood components/blood products, last LTCD4 count, presence of kidney disease, syphilis, herpes simplex, histoplasmosis (independent variables); layer 3 - (influence of social networks); layer 4 - (intermediate determinants: living conditions, working condition, social assistance, education).[6]

It is emphasized that layer 5 (macrodeterminants), which involve society's economic, cultural and environmental conditions, current policies and globalization, was not studied due to the need for a broader assessment of its impacts.

Data were organized in Excel and exported to Stata 13. For analysis of the dichotomous outcome variable (yes/no readmission), the chi-square test was applied to identify statistical significance.

A logistic regression model was applied, and variables that presented p<0.20 in the bivariate analysis were included in this analysis stage. Variables that presented p<0.05 were considered significant, and the Odds Ratio (OR) and 95% Confidence Interval (95%CI) of the variables presented in the final model were calculated.

In a second moment, the outcome was worked out in a multinomial way through the number of readmissions. This variable presented three categories: "no readmissions", "1-2 readmissions", "3 or more readmissions". For the bivariate analysis, simple and relative frequencies were also used. The chi-square test was performed to measure the association between the predictors and the outcome, considering significant when p<0.05.

For the multinomial analysis, "no previous hospitalization" was chosen as the reference category to compare the effect on the other outcome categories. In these models, the OR was identified as a measure and effect and the strength of association was measured by 95%CI. Associations that presented p<0.05 were considered significant.

This research was approved by the Research Ethics Committee, under Opinion 3.308.295 (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration 12342919.0.0000.5044).

Results

Of the total of 262 study participants, 50.8% (n=129) had been hospitalized before. The association of SDH with occurrence of rehospitalization was allocated in Table 1.

As for the sample characterization, the mean age was 40 years. Through the bivariate analysis, it was identified that, among the proximal determinants, 63% (n=51) of people who used illicit drugs were rehospitalized, with an 89% higher chance of rehospitalization in this public. Among the intermediate determinants, rehospitalization was identified in 66.7% (n=36) of people who received (less than or equal) the minimum wage, with a chance 10 times greater in relation to those who receive three or more minimum wages. Regarding working condition, a lower percentage of rehospitalization was observed, with a total of 30.8% in those away from work (n=12), with a 72% greater protection in relation to the unemployed, whose percentage corresponded to 60.9% (n=70). As for social assistance, those receiving Continuous Cash Benefit (BPC) were 7.8 times more likely to be readmitted than those who did not receive social assistance (Table 1). The social determinants that presented p<0.20 were inserted in the multivariate logistic regression model. Through this model, most of variables that were statistically significant in the bivariate analyzes lost their association. These data were arranged in Table 2.

As observed in Table 2, it was only possible to identify an association between social assistance and rehospitalization. Thus, people who received sick pay were 11.7% (95%CI:2.34 – 58.28) times more likely to be readmitted than those who did not receive social assistance. Likewise, BPC beneficiaries showed 12.1 (95%CI: 2.81 – 52.0) times more chances of readmission when compared to people without social assistance. It is noteworthy that these categories had wide confidence intervals, showing that interpretations regarding associations must be made carefully. Table 3 shows data on the association between SDH and the number of readmissions of PLHIV.

When analyzing the number of previous hospitalizations, it was found that 53.4% (n=134) had

Table 1. Association between social determinants of health and occurrence of rehospitalization in people living with HIV (n=129)

Variables	Readmission		p-value *	OR	95%CI
	No n(%) n=133	Yes n(%) n=129			
Individual determinants					
Sex			0.171		
Male	97(53.6)	84(46.4)		0.62	0.39 - 1.21
Female	36(44.4)	45(55.6)		1	-
Mean age			0.818		
<40	61(50.0)	61(50.0)		1.05	0.63 - 1.77
≥40	72(51.4)	68(48.6)		1	-
Color			0.514		
Brown	118(51.5)	111(48.5)		0.78	0.35 - 1.74
Others	15(45.4)	18(55.6)		1	-
Proximal determinants					
Alcohol use			0.126		
Yes	44(41.9)	61(58.1)		1.50	0.86 - 2.60
No	68(51.9)	63(48.1)		1	-
Tobacco use			0.119		
Yes	37(41.6)	52(58.4)		1.53	0.87 - 2.70
No	75(52.1)	69(47.9)		1	-
Illicit drug use			0.023		
Yes	30(37.0)	51(63.0)		1.89	1.05 - 3.42
No	79(52.7)	71(47.3)		1	-
Marital status			0.860		
Single	40(49.4)	41(50.6)		1.05	0.60 - 1.83
Married	90(50.6)	88(49.4)		1	-
Children			0.438		
Yes	55(44.3)	69(55.7)		1.23	0.70 - 2.15
No	51(49.5)	52(50.5)		1	-
Intermediate determinants					
Income (minimum wage) **			0.003		
<1	18(33.3)	36(66.7)		10.0	1.80 - 99.66
1–2	77(52.0)	71(48.0)		4.61	0.93 - 44.34
≥3	10(83.3)	2(16.7)		1	-
Education			0.185		
Illiterate	11(44.0)	14(56.0)		5.72	0.87 - 62.11
Incomplete elementary school	37(40.7)	54(59.3)		6.56	1.23 - 64.74
Complete elementary school	18(48.6)	19(51.4)		4.75	0.80 - 49.55
Incomplete high school	7(46.7)	8(53.3)		5.14	0.65 - 60.92
Complete high school	26(56.5)	20(43.5)		3.46	0.60 - 35.73
Incomplete higher education	3(60.0)	2(40.0)		3.00	0.14 - 56.27
Complete higher education	9(81.8)	2(18.2)		1	-
Working condition			0.001		
Away from work	27(69.2)	12(30.8)		0.28	0.12 - 0.66
Employed	37(58.7)	26(41.3)		0.45	0.23 - 0.88
Unemployed	45(39.1)	70(60.9)		1	-
Social aid			<0.001		
Sick pay	6(40.0)	9(60.0)		1.87	0.56 - 6.68
BPC***	4(13.8)	25(86.2)		7.83	2.53 - 31.96
Retirement	5(31.2)	11(68.8)		2.75	0.84 - 10.50
No	99(55.6)	79(44.4)		1	-
ICU admission			0.50		
Yes	27(55.1)	22(44.9)		0.80	0.41 - 1.57
No	106(49.8)	107(50.2)		1	-

*Test; **minimum wage (2020): US$190.00; ***Continuous Cash Benefit.

Table 2. Multivariate model of social determinants associated with the occurrence of rehospitalization of people living with HIV

	OR	95%CI	p-value
Male	0.56	0.23 - 1.36	0.203
Alcoholic	1.95	0.65 - 5.89	0.235
Smoker	0.55	0.18 - 1.71	0.302
Illicit drug user	2.37	0.86 - 6.56	0.096
Income (minimum wage)			
< 1	5.68	0.70 - 46.18	0.104
1-2	1.25	0.17 - 8.90	0.825
≥ 3	1	-	-
Education (categories from the first table)			
Illiterate	2.87	0.18 - 44.72	0.450
Incomplete elementary school	2.05	0.16 - 26.14	0.579
Complete elementary school	1.92	0.15 - 24.65	0.613
Incomplete high school	0.84	0.05 - 13.94	0.902
Complete high school	1.61	0.14 - 19.03	0.705
Incomplete higher education	**	**	**
Complete higher education	1	-	-
Working condition			
Away from work	0.36	0.10 - 1.24	0.106
Employed	1.10	0.42 - 2.93	0.837
Unemployed	1	-	-
Social aid			
Sick pay	11.69	2.34 - 58.28	0.003
BPC***	12.10	2.81 - 52.00	0.001
Retirement	6.71	0.50 - 89.53	0.150
No	1	-	-

**Could not calculate.

not been hospitalized before; 29.1% (n=73) were readmitted once or twice; and 17.5% (n=44) had three or more readmissions. Among the determinants associated with the number of hospitalizations, it was observed that illicit drug users were the ones who most had three or more hospitalizations (21; 26.9%). Regarding income, it was identified that among people who received up to one minimum wage and those who received from one to two wages, a higher percentage of one to two readmissions was observed, 41.5% (n=22) and 29.5% (n=41) respectively (Table 3). Regarding working condition, the unemployed had a higher percentage of three or more hospitalizations. On the other hand, 41.1% (n=46) of unemployed individuals had no readmissions (p=0.004). Finally, in relation to aid received, it was evidenced that among the participants who received sickness aid; 33.3% (n=5) had been hospitalized one or two times; and 26.7% (n=4) had three or more readmissions. Of those receiving BPC, 42.3% (n=11) were hospitalized once or twice (same figure for those hospitalized three times or more). As for those receiving retirement,

Table 3. Association of social determinants of health with the number of readmissions of people living with HIV

Variables	Number of readmissions			p-value *
	None n(%)	1-2 n(%)	3 or more n(%)	
Individual determinants				0.07
Sex				
Male	98(56.6)	51(29.5)	24(13.9)	
Female	36(46.2)	22(28.2)	20(25.6)	
Mean age				0.909
<40	62(53.9)	32(27.8)	21(18.3)	
≥40	72(52.9)	41(30.2)	23(16.9)	
Color				
Brown	119(54.3)	60(27.4)	40(18.3)	
Others	15(46.9)	13(40.6)	4(12.5)	
Proximal determinants				0.366
Alcohol use				
Yes	44(44.5)	34(34.3)	21(21.2)	
No	69(53.9)	37(28.9)	22(17.2)	
Tobacco use				0.230
Yes	37(43.5)	28(33.0)	20(23.5)	
No	76(54.7)	40(28.8)	23(16.5)	
Illicit drug use				0.030
Yes	30(38.5)	27(34.6)	21(26.9)	
No	80(55.5)	42(29.2)	22(15.3)	
Marital status				0.094
Single	41(51.9)	29(36.7)	9(11.4)	
Married	90(53.3)	44(26.0)	35(20.7)	
Children				0.595
Yes	55(46.6)	41(34.8)	22(18.6)	
No	51(51.5)	28(28.3)	20(20.2)	
Intermediate determinants				
Income (minimum wage) **				0.014
<1	18(34.0)	22(41.5)	13(24.5)	
1–2	77(55.4)	41(29.5)	21(15.1)	
≥3	10(83.4)	1(8.3)	1(8.3)	
Education				0.474
Illiterate	11(50.0)	8(36.4)	3(13.6)	
Incomplete elementary school	38(43.7)	27(31.0)	22(25.3)	
Complete elementary school	18(53.0)	11(32.3)	5(14.7)	
Incomplete high school	7(50.0)	6(42.9)	1(7.1)	
Complete high school	26(56.5)	12(26.1)	8(17.4)	
Incomplete higher education	3(60.0)	2(40.0)	0(00.0)	
Complete higher education	9(81.8)	1(9.1)	1(9.1)	
Working condition				0.004
Away from work	27(71.1)	7(18.4)	4(10.5)	
Employed	37(62.7)	16(27.1)	6(10.2)	
Unemployed	46(41.1)	37(33.0)	29(25.9)	
Social aid				0.001
Sick pay	6(40.0)	5(33.3)	4(26.7)	
BPC***	4(15.4)	11(42.3)	11(42.3)	
Retirement	5(35.7)	6(42.9)	3(21.4)	
No	100(57.8)	50(28.9)	23(13.3)	
ICU admission				0.803
Yes	27(57.5)	12(25.5)	8(17.0)	
No	107(52.5)	61(29.9)	44(17.6)	

*Chi-square test.

42.9% (n=6) were hospitalized once or twice; and 21.4% (n=3) were hospitalized three times or more. An inverse pattern was observed in those who did not receive social assistance, where 28.9% (n=50) were hospitalized once or twice and 13.3%% (n=23) were hospitalized three times or more (p=0.001) (Table 3). The social determinants that presented p<0.20 were inserted in the multivariate logistic regression model. Through this model, it was possible to observe the chances of one or two readmissions and three or more in relation to no previous hospitalization. It was evident that illicit drug use and social assistance remained significant, with sick pay beneficiaries having 6.9 (95%CI: 1.23 – 39.01) times more chances of having 1 to 2 hospitalizations, and those receiving BPC were 8.2 (1.82 – 37.43) times more likely to have 1 to 2 hospitalizations when compared to those who did not receive assistance. As for three or more hospitalizations, 3.7 (95%CI: 1.28 – 11.08) times more likely when there is use of illicit drugs, 45 times (95%CI: 4.46 – 454.06) more likely for sick pay beneficiaries and 23.5 times (95%CI: 4.44 – 125.39) more chance for those who receive BPC compared to those who did not have aid. It is noteworthy that these categories had wide confidence intervals, showing that interpretations regarding associations must be made carefully.

Discussion

The findings of this study allow for reflections on the complexity that permeates the SDH relationship in the context of rehospitalization of PLHIV. Health inequalities are directly related to cases of worsening HIV, as they impact difficulties in accessing health services, adopting a healthy lifestyle, treatment compliance and quality of life.

Thus, the results of this investigation show that in terms of individual determinants, readmissions of male PLHIV, under 40 years of age and mixed race prevailed. Corroborating other studies about the profile and vulnerabilities that directly reflect on PLHIV's health.[8-10] Culturally, men are less likely to take care of themselves and seek health services as

well as being involved in situations of greater health risk.[10]

Among the proximal determinants, illicit drug use, tobacco use, alcohol use, income less than or equal to the minimum wage, incomplete elementary school and unemployment were associated with cases of PLHIV readmission. Regarding the use of drugs, whether legal or not, they are commonly related to the practice of unprotected sex and/or in exchange for benefits, and it is necessary to consider other social aspects as determinants of hospitalization.[11,12] Furthermore, unemployment and a low level of education may also be related to limitations for self-care and a decrease in quality of life.[13] The fact of being employed can be an element of protection against hospitalization, in addition to the fact that the presence of a source of income is a determinant to ensure quality of life.

And as for the intermediate determinants, it was observed that BPC beneficiaries were more related to cases of hospital readmission. PLHIV with some type of assistance or benefit may be more likely to be hospitalized.[10,11] On the other hand, these show better compliance with intervention actions and health promotion in spaces specialized in HIV.[10]

Regarding the association between illicit drug use and the readmission process, this study showed statistical significance for this association. In this regard, licit and illicit substance and drug use is directly related to physical and psychological health problems, cases of interpersonal violence, in addition to reducing the link with health services, compliance and consistent use of ART, and increasing the risk for other infections and comorbidities.[11, 12]

On the other hand, variables related to monthly income (up to one minimum wage) and education (incomplete elementary school) identified in this study are mentioned, data that can directly influence PLHIV's health status and vulnerabilities. It is believed that the higher the level of education, the greater the possibility of accessing information.[10] PLHIV with lack or low income are more likely to live in unstable housing and have less education.[13] These findings may suggest the need to implement continuous efforts and interventions that can improve the health care of PLHIV with low education, in addition to the need to consider offering educational opportunities for this population.[11, 12, 14]

Thus, the context and social determinants are essential factors that influence PLHIV's health status. Thus, individual, socioeconomic and educational conditions interfere in the way in which individuals acquire and live with HIV, and it is important to act to promote health gains to reduce social inequalities and to seek to improve the access of PLHIV to essential services.[8,15]

The research presents as a limitation its cross-sectional nature, directed to the regional population, which prevents the generalization of data. It should also be noted that layer 5 was not investigated, referring to the macro-determinants that involve society's economic, cultural and environmental conditions, current policies and globalization. This is because they are more comprehensive and require a more detailed assessment of their impacts. Moreover, although education was addressed in this work, data specifically on health knowledge were not investigated, and this is an important variable that deserves investigation in future research.

This study contributes to the area of public health, through identification of SDH that can affect health outcomes and be associated with occurrence of readmissions of PLHIV, and, from this, to intervene in a targeted manner and with an interdisciplinary team in the expanded clinic and with public policies aimed at reducing health inequalities. Also, it is intended to contribute to building predictive tools to improve interventions, approaches used in PLHIV that continue to have negative health effects, in addition to improving the optimization of health information systems to inform these inequities and simultaneously help recognize the critical and financial impact of SDH on health outcomes.

Conclusion

In this study, SDH were identified and classified based on data obtained from patients' medical records, classified into individual, proximal and intermediate determinants, as well as it was possible

to list their relationship with the profile of readmissions of PLHIV and the number of readmissions.

It was observed that more than half of medical records analyzed had a readmission record. Among the most prevalent SDH in readmissions, there was a highlight in records of illicit drug use as well as among those who earned less than or equal to a minimum wage and those receiving BPC aid.

After multivariate logistic regression, it was possible to observe the chances of one or two readmissions and three or more in relation to no previous hospitalization. It was evident that illicit drug use and social assistance remained significant, highlighting the relationship between these determinants and the outcome in PLHIV's therapeutic management at the level of hospital care.

Faced with such findings, it is evident the need to consider the multiple dimensions in coping with HIV, which must be based on health promotion, strengthening of Unified Health System (SUS – *Sistema Único de Saúde*) public policies, care management, including the construction of unique therapeutic plans consistent with users' real needs. In this regard, there is still an urgent need to strengthen specialized services in HIV, in particular with regard to the composition of minimal, trained teams, with humanized care to listen and welcome PLHIV's health demands in their singularities and contexts, be they health, social, economic, among others.

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Maia JKO collaborated with conception and project, data interpretation, active participation in the discussion of results, article writing, relevant critical review of intellectual content, review and final approval of the version to be published. Lima RCRO collaborated with conception and project, data interpretation e active participation in the discussion of results, article writing, relevant critical review of intellectual content, review and final approval of the version to be published; Mota NP participated in data interpretation, active participation in the discussion of results, article writing, relevant critical review of intellectual content, review and final approval of the version to be published. MAIA JC participated in article writing e relevant critical review of intellectual content, review and final approval of the version to be published. Galvão MTG participated in data interpretation, active participation in the discussion of results, relevant critical review of intellectual content, review and final approval of the version to be published. Aquino OS collaborated with data interpretation, active participation in the discussion of results, relevant critical review of intellectual content, review and final approval of the version to be published.

References

1. UNAIDS. Global AIDS update. Joint United Nations Programme on HIV/AIDS. Geneva: UNAIDS; 2020 [cited 2022 Nov 21. Available from: https://www.unaids.org/sites/default/files/media_asset/2020_global-aids-report_executive-summary_en.pdf
2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico HIV/AIDS. Brasília (DF): Ministério da Saúde; 2021 [citado 2022 Nov 21]. Disponível em: http://www.aids.gov.br/pt-br/pub/2021/boletim-epidemiologico-hivaids2021.
3. Santos AC, Mendes B, Andrade CF, Carvalho MM, Espírito-Santo LR, D'Angelis CE, et al. Perfil epidemiológico dos pacientes internados por HIV no Brasil. Rev Eletrônica Acervo Saúde. 2020;48:e3243.
4. Geretti AM, Stockdale AJ, Kelly SH, Cevik M, Collins S, Waters L, et al. Outcomes of coronavirus disease 2019 (COVID-19) related hospitalization among people with Human Immunodeficiency Virus (HIV) in the ISARIC World Health Organization (WHO) Clinical Characterization Protocol (UK): a Prospective Observational Study. Clin Infect Dis. 2021;73(7):e2095-e2106.
5. World Health Organization (WHO). A conceptual framework for action on the social determinants of health. Geneva: WHO; 2010 [cited 2022 Nov 21]. Available from: https://apps.who.int/iris/bitstream/handle/10665/44489/9789241500852_eng.pdf?sequence=1&isAllowed=y
6. Dahlgren G, Whitehead M. Policies and strategies to promote social equity in health. Stockholm: IFS; 1991.
7. Hogan JW, Galai N, Davis WW. Modeling the Impact of Social Determinants of Health on HIV. AIDS Behav. 2021;25(Suppl 2):215-24.

8. Silva RA, Costa RH, Braz LC, Lucena IA, Ferreira KS, Duarte FH. People living with AIDS: Association between nursing diagnoses and sociodemographic/clinical characteristics. Rev Bras Enferm. 2018;71(5):2535-42.

9. Fuster-RuizdeApodaca MJ, Castro-Granell V, Laguía A, Jaén Á, Cenoz S, Galindo MJ. Drug use and antiretroviral therapy (ART) interactions: a qualitative study to explore the knowledge, beliefs, adherence, and quality of life of people living with HIV taking ART and illicit drugs. AIDS Res Ther. 2020;17(1):24.

10. Nijhawan AE, Metsch LR, Zhang S, Feaster DJ, Gooden L, Jain MK, et al. Clinical and sociobehavioral prediction model of 30-day hospital readmissions among people with HIV and substance use disorder: beyond electronic health record data. J Acquir Immune Defic Syndr. 2019;80(3):330-41.

11. Summers NA, Colasanti JA, Feaster DJ, Armstrong WS, Rodriguez A, Jain MK, et al. Predictors for poor linkage to care among hospitalized persons living with HIV and co-occurring substance use disorder. AIDS Res Hum Retroviruses. 2020;36(5):406-14.

12. Djiadeu P, Smith MD, Kushwaha S, Odhiambo AJ, Absalom D, Husbands W, et al. Social, Clinical, and Behavioral Determinants of HIV Infection and HIV Testing among Black Men in Toronto, Ontario: A Classification and Regression Tree Analysis. J Int Assoc Provid AIDS Care. 2020;19:2325958220934613. Review.

13. Primeira MR, Santos WM, Paula CC, Padoin SM. Quality of life, adherence and clinical indicators among people living with HIV. Acta Paul Enferm. 2020;eAPE20190141.

14. Lopes LM, Andrade RL, Arakawa T, Magnabosco GT, Nemes MI, Netto AR, et al. Vulnerability factors associated with HIV/AIDS hospitalizations: a case-control study. Rev Bras Enferm. 2020;73(3):e20180979.

15. Silva DG, Lima RC, Oliveira FG, Otero SF, Nátario RM, Pereira LT, et al. Perfil epidemiológico de pacientes internados por HIV/AIDS no Brasil: revisão integrativa da literatura. Res Soc Devel. 2021;10(9):e19410917976. Review.