

Prevalence of early hospital readmissions in a reference unit for the treatment of people living with HIV located in Ribeirão Preto, Brazil

Prevalência de reinternações hospitalares precoces em unidade de referência para tratamento de pessoas que vivem com HIV situada em Ribeirão Preto, Brasil

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ABSTRACT

Introduction: The 30-day readmission rate after discharge has been used to indicate healthcare quality. However, precise data on this indicator are still scarce in Brazil, especially among people living with HIV. **Objective:** The objectives of this study were to describe the rate of early hospital readmissions in people living with HIV and the sociodemographic and clinical characteristics of readmitted patients and to identify the factors associated with readmissions. **Methods:** This prospective cohort study was conducted with patients admitted between August 2016 and August 2018 in a university hospital in the state of São Paulo, Brazil. Clinical and laboratory data, social indicators, use of illicit drugs, and adherence to antiretroviral treatment were evaluated. Participants were monitored for hospital readmissions within 30 days after discharge from the index hospitalization. **Results:** A total of 71 patients were included. There was a predominance of men aged between 30 and 60 years, with low socioeconomic and educational levels, inadequate control of HIV infection, and frequent use of psychoactive substances. The 30-day readmission rate found was 22%. Gastrointestinal diseases were the most frequent in index hospitalizations and early readmissions. **Conclusion:** The early readmission rate in people living with HIV was 22%. Gastrointestinal diseases were the most prevalent in the index of hospitalization and early readmissions. Most of the patients admitted and readmitted are middle-aged men with a low level of education, low insertion in the labor market, a considerable rate of psychoactive substance use, and living in conditions of social vulnerability.

Keywords: Acquired immunodeficiency syndrome. HIV. Hospital readmissions. Opportunistic infections.

RESUMO

Introdução: A taxa de reinternação em 30 dias após a alta tem sido usada para indicar a qualidade dos cuidados de saúde. No entanto, dados precisos sobre esse indicador ainda são escassos no Brasil, principalmente entre pessoas que vivem com HIV. **Objetivo:** Avaliar a taxa de reinternação hospitalar precoce em pessoas que vivem com HIV, bem como o perfil dos pacientes readmitidos, e identificar fatores associados às readmissões. **Métodos:** Estudo tipo coorte prospectivo com pacientes internados entre agosto de 2016 e agosto de 2018 em hospital universitário do estado de São Paulo, Brasil. Foram avaliados dados clínicos, laboratoriais, indicadores sociais, uso de drogas ilícitas e adesão ao tratamento. Os participantes foram monitorados quanto à reinternação hospitalar no período de 30 dias após a internação índice. **Resultados:** Foram incluídos 71 pacientes, com predomínio de homens entre 30 e 60 anos, com baixo nível socioeconômico e de escolaridade, controle inadequado da infecção pelo HIV e uso frequente de substâncias psicoativas. A taxa de reinternação em 30 dias encontrada foi de 22%. As doenças gastrointestinais foram as mais frequentes nas internações índices e nas reinternações precoces. **Conclusão:** A taxa de reinternação precoce em pessoas que vivem com HIV foi de 22%. As doenças gastrointestinais foram as mais prevalentes. Houve predomínio de homens, com baixo nível de escolaridade, baixa inserção no mercado de trabalho, considerável taxa de uso de substâncias psicoativas e condições de vulnerabilidade social nas admissões e readmissões precoces.

Palavras-chave: AIDS. HIV. Readmissão hospitalar. Doenças oportunistas.

INTRODUCTION

The epidemiology of human immunodeficiency virus (HIV) infection has undergone profound changes since its inception in the early 1980s, especially since the mid-1990s, with the advent of a more efficacious antiretroviral therapy (ART). Since then, there has been a considerable decline in mortality from causes related to acquired immunodeficiency syndrome (AIDS) in several regions of the world, with a proportional increase in mortality from liver disease, cardiovascular disease, and non-AIDS-related cancer⁽¹⁾. Despite the reduction in incidence, opportunistic illnesses associated with AIDS still account for considerable mortality rates in people living with

HIV (PLHIV) in high- and low-income countries⁽²⁻⁴⁾. According to a meta-analysis published in 2015, including data from more than 300,000 adults and children living with HIV in different countries, AIDS-associated diseases accounted for 46% of hospital admissions⁽⁵⁾. Other studies found hospitalization rates of 27%⁽⁶⁾ and 34%⁽⁷⁾.

Data from the Brazilian Ministry of Health show that the number of hospitalizations related to HIV infection in public hospitals in 2017 and 2018 was 32,279 and 30,453, respectively. The costs of hospital services represented more than 40 million reais for each year of this period⁽⁸⁾. In this context, implementing strategies to prevent hospital admissions is a primary concern for healthcare providers. A considerable fraction of hospitalizations results from readmissions after discharge from the initial hospitalization (index hospitalization or admission). Readmissions occur for different reasons and can be defined according to their predictability. Thus, they can be classified as predictable, unpredictable—related to a problem present in the index hospitalization, and unpredictable—related to a new problem^(9,10).

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The early hospital readmission rate, generally defined as readmission within 30 days after discharge, has been used to indicate the quality of hospital care provided. In some parts of the world, health plans promote programs to reduce early readmissions and financially punish hospitals with excessive rates of early readmissions. Traditionally, these programs have focused on common clinical conditions such as acute myocardial infarction, heart failure, and pneumonia⁽¹¹⁾. International studies have shown 30-day hospital readmission rates of 19% and 25% among PLHIV^(12,13). These rates are comparable to those of patients with congestive heart failure^(14,15) and higher than those described in acute myocardial infarction⁽¹⁶⁾. Early readmission rates in PLHIV are poorly studied in Brazil.

OBJECTIVE

Thus, this study aimed to evaluate the rate of early hospital readmissions in a unit specialized in the care of PLHIV. The study also aimed to characterize the clinical, social, and demographic profile of admitted and early readmitted patients and identify the factors associated with readmissions.

METHODS

This prospective cohort study was conducted in a PLHIV inpatient unit of a tertiary reference hospital in Ribeirao Preto, São Paulo, Brazil. Patients aged 13 years or older, hospitalized between August 2016 and August 2018, were invited to participate in the study. Patients were included during the index hospitalization when the following data were collected: gender; age; diagnosis of the leading admission cause; CD4+ T-cell count; HIV viral load; social indicators; historic of illicit drug use; and adherence to ART (withdrawal of medications at the pharmacy in the last 2 months and self-declaration on the regular use of these medications). After discharge, patients were monitored for readmission. In cases of readmission within 30 days after the index hospitalization, data regarding the diagnosis for readmission and adherence to ART after discharge were recorded. The research protocol and informed consent form were approved by the research ethics committee of the institution (protocol number 5158/2016). All participants provided informed consent.

Statistical analysis

Categorical qualitative variables were expressed as numbers (n) and percentages. Continuous variables were expressed as median, minimum, and maximum values, as they did not present a normal distribution. To identify the risk factors for the latter condition, the comparison of variables between patients who did not and those who had early hospital readmission was performed by estimating the relative risks using the Poisson regression model with robust variance. For all analyses, a significance level of 5% was adopted. The analyses were performed using the SAS 9.2 software (SAS Inst., Cary, NC, 2011).

RESULTS

A total of 71 patients were included. **Table 1** presents the demographic and social characteristics of the included participants. There

was a predominance of male individuals aged between 30 and 60 years (78.9%). Regarding marital status, there was a predominance of single individuals (63.4%). Most (64.8%) attended school up to 8 years, and only one individual (1.4%) had a formal job. Only 29 participants (40.8%) have their own home, with six (8.5%) being homeless. Also, 30 patients (42.3%) had no source of income.

Regarding the use of psychoactive substances, current use of alcohol, cocaine, crack, and marijuana was detected among the participants. Notably, 16 patients (22.5%) reported daily use of alcohol. Frequent use of cocaine and crack was reported by 3 (4.2%) and 10 (14%), respectively. Marijuana use was reported only by one patient (1.4%). Finally, 28 patients (39%) reported using at least one evaluated substance frequently.

A total of 68 patients (95.8%) were on ART prescription. Of these, 29 (42.6%) did not withdraw their medications on the

Table 1. Sociodemographic characteristics of the patients in the index hospitalization.

| Characteristics | n (%) (n=71) |
|-----------------------------|--------------------------|
| Male | 48 (67.6) |
| Age (years) | |
| <30 | 8 (11.3) |
| 30–60 | 56 (78.9) |
| >60 | 7 (9.8) |
| Marital status | |
| Living with a partner | 3 (4.2) |
| Married | 9 (12.7) |
| Single | 45 (63.4) |
| Divorced | 6 (8.5) |
| Widowed | 8 (11.2) |
| Years of schooling | |
| ≤8 | 46 (64.8) |
| >8 | 25 (35.2) |
| Labor market situation | |
| Unemployed | 30 (42.3) |
| Social security beneficiary | 30 (42.3) |
| Informal job | 3 (4.2) |
| Formal job | 1 (1.4) |
| Retired | 7 (9.9) |
| Monthly income* (R\$) | 933.00 (650.00–2,500.00) |
| Housing conditions | |
| Rented house | 7 (9.9) |
| Long-term care facility | 1 (1.4) |
| Assigned property | 26 (36.6) |
| Financed property | 2 (2.8) |
| Own property | 29 (40.8) |
| Homeless | 6 (8.5) |

*Results are shown as median (Min–Max) and only for participants with a source of income.

scheduled date in the month preceding the date of admission, and 36 (52.9%) reported not using these medications regularly. The median CD4+ T-cell count was 129/mm³. Notably, 60% of the patients had a CD4+ T-cell count below 200 cells/mm³. Only 18 patients (25.3%) had undetectable HIV viral load (<40 copies/mL). The median viral load value for the other patients was 111,000 copies/mL. **Table 2** presents the patients' diagnoses, in the index hospitalization, according to the organ systems involved. Gastrointestinal and pulmonary diseases were predominant, accounting for 58% of the diagnosis.

Of the 71 patients included, 16 (22.5%) were readmitted to the hospital within 30 days. Ten (62.5%) were single males with a median age of 43 years and ≤9 years of schooling (incomplete elementary school education). None had a formal job, and only four (25%) owned their home. Regular use of psychoactive substances was reported by six individuals (37.5%) in this group. **Table 3** shows the diagnostic categories in the readmissions. In only three individuals, there was a change in the diagnosis in comparison to that of the index hospitalization.

Regarding the characteristics of the patients who had 30-day readmission, 11 (68.7%) reported having low adherence to ART.

Table 2. Diagnostic category of the patients in the index hospitalization.

| Diagnostic category | n (%) |
|------------------------------|-----------|
| Gastrointestinal | 24 (33.8) |
| Pulmonary | 15 (21.1) |
| Central nervous system | 9 (12.7) |
| Systemic | 6 (8.5) |
| Renal/genitourinary | 4 (5.6) |
| Lymphohematopoietic | 3 (4.2) |
| Liver | 3 (4.2) |
| Gastrointestinal + pulmonary | 2 (2.9) |
| Ophthalmologic | 1 (1.4) |
| Genital | 1 (1.4) |
| Lymphohematopoietic | 1 (1.4) |
| Psychiatric | 1 (1.4) |
| Dermatological | 1 (1.4) |
| Total | 71 (100) |

Table 3. Diagnostic category of the patients in readmissions.

| Diagnostic category | n (%) |
|------------------------|-----------|
| Gastrointestinal | 10 (62.2) |
| Lymphohematopoietic | 1 (6.3) |
| Systemic | 1 (6.3) |
| Genital | 1 (6.3) |
| Central nervous system | 1 (6.3) |
| Psychiatric | 1 (6.3) |
| Pulmonary | 1 (6.3) |
| Total | 16 (100) |

The median CD4+ T-cell count was 93 cells/mm³. Only four (25%) subjects in this group had undetectable HIV viral load. For the others, the median HIV viral load was 7,893 copies/mL. **Table 4** shows sociodemographic variables, ART use, CD4+ T-cell count, and viral load between patients who had and those who did not have early readmission. The two groups had similar characteristics regarding the explored variables.

DISCUSSION

A predominance of middle-aged men with low socioeconomic and educational levels characterizes the sample of patients evaluated in this study. Only one individual had a formal job, and most did not own property. Regarding the control of HIV infection, most patients had a low CD4+ T-cell count, and only 25% had an undetectable HIV viral load. It should also be mentioned the frequent use of psychoactive substances, such as alcohol, crack, cocaine, or marijuana. Carrico et al. also observed, in a large cohort of PLHIV, a considerable prevalence of psychoactive substance use⁽¹⁷⁾. The authors verified the use of alcohol in 25% of the participants and of stimulating substances (crack, cocaine, and amphetamines) in 15%. Still in this study, the authors verified that, in individuals under ART prescription, the reported use of psychoactive substances was associated with five times higher HIV viral load compared to those who reported not using the substances⁽¹⁷⁾. Other studies also reinforce the association between the use of psychoactive substances and poor control of HIV infection⁽¹⁸⁻²⁰⁾.

The 30-day readmission rate found in this study was 22%. This result is comparable to that of international studies with PLHIV, which described rates of 19–25%^(12,13,21,22). Coelho et al., in a study conducted at the Instituto Nacional de Infectologia Evandro Chagas, Rio de Janeiro, Brazil, found a lower early readmission rate of 14% for PLHIV⁽²³⁾. Differences in the characteristics of the studied populations, the functionality of local health systems, or possible readmissions outside the referral hospital may explain the lower rates observed in the study.

The early readmission rate of 22% in PLHIV is considerably higher than that described in the general population of the United States, where it is estimated at 14% considering all causes globally⁽²⁴⁾. In Brazil, the inclusion of the 30-day hospital readmission rate as an indicator of the quality of healthcare was adopted by the Brazilian National Agency of Supplementary Health (ANS) in 2015. Precise data on this indicator are not yet available in Brazil, but it is estimated that it is higher than that of the United States, around 20% for all causes⁽²⁵⁾. Less is known about this indicator, specifically for clinical conditions associated with HIV infection.

We did not observe any differences between patients who had and those who had not readmission in 30 days after the index hospitalization. Although adequate for a prospective study, the limited number of patients included may have limited the analyses. The world and national reference studies were retrospective studies with larger samples. Coelho et al. found that low CD4+ T-cell counts and hospital discharge against medical recommendations increased the risk of hospital readmission within 30 days. On the contrary, attending a medical follow-up within 30 days after discharge from the index

Table 4. Characteristics of patients with and without early readmission.

| | Without early re-admission (n=55) | Early readmission (n=16) | RR | 95%CI | p |
|--------------------------------|-----------------------------------|--------------------------|------|--------------|------|
| | n (%) | n (%) | | | |
| Gender | | | | | |
| Male | 38 (69) | 10 (62.5) | 1 | | |
| Female | 17 (31) | 6 (37.5) | 1.25 | (0.5–3.14) | 0.63 |
| Age (years) | | | | | |
| <30 | 5 (9) | 3 (19) | 2.62 | (0.33–20.85) | 0.36 |
| 30–60 | 44 (80) | 12 (75) | 1.5 | (0.23–9.71) | 0.67 |
| >60 | 6 (11) | 1 (6) | 1 | | |
| Marital status | | | | | |
| Living with a partner | 9 (16.4) | 3 (18.8) | 1.13 | (0.36–3.55) | 0.83 |
| Without a partner | 46 (83.6) | 13 (81.2) | 1 | | |
| Years of schooling | | | | | |
| >9 | 19 (34.5) | 6 (37.5) | 1.1 | (0.44–2.77) | 0.83 |
| ≤9 | 36 (65.5) | 10 (62.5) | 1 | | |
| Stable source of income | | | | | |
| No | 24 (43.6) | 6 (37.5) | 1 | | |
| Yes | 31 (56.4) | 10 (62.5) | 1.22 | (0.49–3.06) | 0.67 |
| Housing conditions | | | | | |
| Homeless | 3 (5.5) | 3 (18.8) | 3.25 | (0.91–11.56) | 0.07 |
| Assigned property | 19 (34.5) | 7 (43.7) | 1.75 | (0.64–4.75) | 0.27 |
| Own or rented property | 33 (60) | 6 (37.5) | 1 | | |
| Use of psychoactive substances | | | | | |
| No | 33 (60) | 10 (62.5) | 1 | | |
| Yes | 22 (40) | 6 (37.5) | 0.92 | (0.37–2.31) | 0.86 |
| Reported use of ART* | | | | | |
| Regular | 29 (55.8) | 8 (50) | 1 | | |
| Irregular | 23 (44.2) | 8 (50) | 1.12 | (0.46–2.73) | 0.80 |
| Pick up ART prescription† | | | | | |
| No | 23 (44.2) | 6 (37.5) | 1 | | |
| Yes | 29 (55.8) | 10 (62.5) | 1.24 | (0.5–3.09) | 0.64 |
| CD4+ T-cell count§ | | | | | |
| <200 cells/mm ³ | 32 (58.2) | 11 (68.7) | 1.43 | (0.55–3.74) | 0.46 |
| ≥200 cells/mm ³ | 23 (41.8) | 5 (31.3) | 1 | | |
| HIV viral load§ | | | | | |
| Detectable | 41 (74.5) | 12 (75) | 1.02 | (0.36–3.74) | 0.97 |
| Undetectable | 14 (25.5) | 4 (25) | 1 | | |

ART: antiretroviral therapy.

*Result presented for 68 patients who were prescribed an antiretroviral regimen, 52 of which were included in the group without readmission and 16 in the other group.

†Month prior to the index hospitalization.

§Performed within 6 months of the index hospitalization.

hospitalization was protective against early readmission⁽²³⁾. In another study, Berry et al. observed that a reduction in CD4+ T-cell counts, longer length of index hospitalization, and specific categories of diseases were factors related to early hospital readmission⁽¹³⁾. In this

study, the categories most related to early readmission were oncological diseases, in first place, followed by hematological, gastrointestinal, hepatic diseases, AIDS-defining diseases, and neurological and endocrinological diseases.

In this study, gastrointestinal diseases were the most frequent in index hospitalizations and more than 60% of early readmissions. In patients with AIDS, gastrointestinal manifestations such as nausea, vomiting, and diarrhea are among the most frequent. They are often associated with low CD4+ T-cell counts and present a relapsing character when there is no reconstitution of immunity with ART⁽²⁶⁾.

This study is relevant in addressing an issue of increasing importance, especially in Brazil, where data on early hospital readmission rates still need to be explored, especially in the group of PLHIV. This indicator can help develop organizational strategies and the quality control of the health service provided to the population. Another relevant point of the study was the inclusion of social and economic vulnerability conditions and the use of psychoactive substances that a considerable portion of this population presents. These data highlight the need for a multidisciplinary team in PLHIV hospitalization units. It should also be noted that the study had shortcomings to be considered. The number of patients included was limited. The world and national reference studies on the subject were retrospective and are based on an extensive database composed over time in the proposing units. Other variables not included, such as laboratory aspects, some details of the clinical diagnosis, or even more specific social and psychological aspects, could provide additional information.

CONCLUSION

Considering this study's findings, the rate of early readmission in a reference hospital for the care of PLHIV in Brazil was 22%. Gastrointestinal diseases were the most prevalent in the index of hospitalization and early readmissions. Most of the patients admitted and readmitted are middle-aged men with a low level of education, low insertion in the labor market, a considerable rate of psychoactive substance use, and living in conditions of social vulnerability.

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Approval by the Human Research Ethics Committee

The research protocol and informed consent form were approved by the research ethics committee of the institution (CAAE record: 54545716.2.0000.5440). All participants provided informed consent.

Participation of each author

RCS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. LMO: Conceptualization, Data curation, Formal analysis, Project administration, Writing – original draft.

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Conflict of interests

The authors declare there is no conflict of interest.

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