Short Communication

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Causes of hospital admission of AIDS patients in southern Brazil, 2007 to 2012

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ABSTRACT

Introduction: The acquired immunodeficiency syndrome (AIDS) epidemic is a worldwide phenomenon that has been modified with the implementation of effective antiretroviral therapy. The objective of this study was to determine the leading causes of hospitalization among human immunodeficiency virus (HIV)-positive individuals. **Methods**: A cross-sectional study with patients admitted to a general hospital in southern Brazil, between January 2007 and May 2012. **Results**: Medical records of 550 hospital admissions (230 patients) were reviewed, with an average of 2.4 hospitalizations per patient. Infectious diseases were the most prevalent causes of hospitalization. Overall, 44.8% patients died and their deaths were associated with longer hospital stays. **Conclusions**: Opportunistic infections remained the leading causes of hospitalization.

Keywords: Acquired immunodeficiency syndrome. Hospitalization. AIDS-related opportunistic infections.

In Brazil, since the beginning of the epidemic in 1980 through June 2011, there have been 608,230 cases of acquired immunodeficiency syndrome (AIDS) and 241,469 deaths, with an incidence rate of 17.9/100,000 population in 2010[1]. However, it is estimated that 490,000 (430,000-570,000) people are infected with the human immunodeficiency virus (HIV) in Brazil, many of whom are unaware of their HIV status[2].

Currently, there is a tendency towards stabilization of the epidemic, especially in southeastern Brazil, but there has been an increase in other regions, mainly in the southern region[1]. In the state of Santa Catarina, there were 26,998 reported cases of AIDS between 1984 and 2011, and the incidence rate in 2011 was 33.3/100,000 population, which is higher than the national rate[3].

The use of antiretroviral therapy (HAART) from 1996 onward has changed the natural history of the disease, and today AIDS is considered a chronic disease; life expectancy has increased, and morbidity and mortality rates have decreased, providing patients with a better quality of life. However, disease control remains a challenge, due to non-adherence to drug treatment and delayed diagnosis. AIDS, therefore, is still considered a fatal disease[4,5].

The AIDS mortality rate in Brazil is estimated at 6.3/100,000 population, with a decrease of 11.1% over the past 10 years. However, there has been an increase in the number of AIDS-related deaths in the southern region, with an incidence rate of 8.6/100,000 population in the State of Santa Catarina. This is due in part to late diagnosis, failure to support HIV-infected patient care, and poor adherence to treatment[3].

Based on the above, the purpose of this study was to determine the main causes of hospitalization among HIV-positive individuals, as well as sociodemographic and clinical conditions associated with the disease in these patients.

This study was approved by the Ethics Committee of the University of Southern Santa Catarina, under registration No. 12.143.4.01.III, on July 23, 2012.

This was a cross-sectional epidemiological study with secondary data collection. We evaluated the electronic medical records of all hospitalized patients, including children. The International Classification of Diseases (ICD) was used to codify HIV infection, corresponding to groups B20 to B24, F02.4, R75, Z11.4, Z20.6, Z21, and Z71.7, considered HIV/AIDS-defining events. The study was conducted at a general hospital in southern Brazil, from 1 January 2007 to 31 May 2012. The data extraction tool contained sociodemographic variables (age, gender, education, place of residence, and marital status) and clinical variables (duration and number of hospitalizations, ICD coding for patient admission, outcome of the last hospitalization, and cause of death specified on the death certificate). The collected data were entered into a database by using the EpiData software version 3.1 (EpiData Association, Odense, Denmark). The Statistical Package for Social Sciences (SPSS for Windows v. 18, Chicago, IL, USA) was used to perform statistical analysis. Descriptive epidemiology was used to present the data in terms of absolute and relative values. Qualitative variables were expressed as proportions, whereas quantitative variables were described using measures of central tendency and dispersion.

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Prevalence ratios were calculated to investigate the association between the variables of interest, and Student's t-test was used for mean comparisons. The significance level was set at 0.05.

Medical records of 550 hospital admissions (230 patients) were reviewed during the study period, with an average of 2.4 (range: 1-10) hospitalizations per patient. The length of stay ranged from 1 to 383 days, with a mean of 13.3 ± 11.1 days and a median of 10.4 days.

Age ranged from 4 to 71 years, with an average of 40.9 ± 11.1 years. In all, 67.4% of the participants were men, and 33.6% had a steady partner. The description of the sociodemographic data is presented in **Table 1**.

A review of medical records revealed that 75 (32.6%) patients were on antiretroviral therapy, and 77 (33.5%) were not under treatment or had no medication adherence. In 78 (33.9%) cases, there was no information about whether or not the patients were on antiretroviral therapy. Furthermore, only 18 patients had a record of their last cluster of differentiation 4 $(CD4)^+$ T-cell count, which ranged between 24-436 cells/mm^3 (median: 158.5 cells/mm^3). Of the total, 22 (9.6%) patients were diagnosed with HIV infection during hospitalization.

Table 2 shows the distribution of diseases or reasons for hospital admissions found in the medical records of HIV-infected patients hospitalized during the study period. The ICDs were grouped based on similarity or involvement of a particular body system for the presentation of the data. All infections, regardless of the etiologic agent or the affected organs, were classified in the same group, except for those registered with HIV-defining ICDs, the latter totaling 136 occurrences.

B24 was the most prevalent ICD code for HIV, which appeared in 94 (29.9%) of the medical records reviewed. AIDS-defining events are shown in **Table 3.**

Some ICD codes such as B21.1, B21.3, B21.7, B21.8, B21.9, B22.1, B22.2, B22.7, F02.4, R75, Z11.4, Z20.6, Z21, Z71.7, and Z83.0 were not found in the medical records and so were excluded from **Table 3**.

The results encompass all ICD codes for diseases caused by infectious agents and include those for AIDS-defining disease; namely, B20.0, B20.1, B20.2, B20.3, B20.4, B20.5, B20.6, B20.7, B20.8, and B20.9. The highest prevalence was found among the group caused by bacterial infections, which occurred in 32.8% of cases, followed by unspecified infectious diseases, and fungal, viral, and parasitic infections.

Regarding outcomes, 127 (55.2%) patients were discharged from hospital and 103 (44.8%) died. Among the causes of death specified on the death certificate, 36 (35%) were related

TABLE 1 - Socio-demographic characteristics of the study population and death-related prevalence ratio (n = 230).

	Total		Death			
Characteristics	n	%	n	%	PR (95% CI)	p-value
Gender						
female	75	32.6	36	35.0	1.0	
male	155	67.4	67	65.0	0.97 (0.88–1.06)	0.493
Age (years)						
4-19	5	2.1	1	1.0	0.88 (0.63–1.25)	0.485
20-39	106	46.1	51	49.5	1.09 (0.90–1.33)	0.381
40-59	105	45.7	46	44.7	1.06 (0.87–1.29)	0.563
≥60	14	6.1	5	4.9	1.0	
Place of residence						
Tubarão	122	53.0	53	51.5	1.43 (1.35–1.53)	<0.001
nearby towns	106	46.1	50	48.5	1.47 (1.38–1.57)	<0.001
other states or country	2	0.9	0	0.0	1.0	
Marital status						
single/divorced/widowed	152	66.4	66	64.1	0.97 (0.88–1.06)	0.504
married/concubinary	77	33.6	37	35.9	1.0	
Education (years)						
≤8	175	76.4	80	77.7	1.02 (0.92–1.14)	0.687
>8	54	23.6	23	22.3	1.0	

PR: prevalence ratio; **95% CI: 95**% confidence interval.

TABLE 2 - Causes of hospitalization among HIV-infected patients.

Diseases or reasons for hospitalization	Number	Percentage
HIV/AIDS-defining events*	314	40.0
Parasitic/infectious diseases	260	33.2
Digestive system diseases	43	5.5
Nervous system diseases/manifestations	43	5.5
Nonspecific symptoms	37	4.8
Pulmonary diseases	26	3.3
Cardiovascular diseases	12	1.5
Nutritional alterations	12	1.5
Renal disorders	12	1.5
Others**	11	1.4
Reproductive system diseases	7	0.9
Hematologic diseases	6	0.8
Dermatological manifestations	1	0.1
Total	784	100.0

HIV/AIDS: human immunodeficiency virus/acquired immunodeficiency syndrome. *International Classification of Diseases: B20 to B24, F02.4, R75, Z11.4, Z20.6, Z21, and Z71.7. **Others: psychotic disorders, convalescence after surgery, acute poisoning, finger injury without nail injury, lupus erythematous, personal history of substance abuse, personal history of other physical traumas. Some patients had more than one diagnostic cause for hospitalization.

to the nervous system (meningitis, toxoplasmosis, encephalitis, cryptococcal meningitis, and others); 33 (32%) died of sepsis; 24 (23.3%) of acute respiratory distress (pneumonia, tuberculosis, pneumocystis pneumonia, respiratory failure, and the like); 7 (6.8%) died of liver complications; and 3 (2.9%) due to multiple organ failure without a specific cause. Some death certificates specified more than one cause of death, all attributed to AIDS.

The length of stay was shorter (mean 11.2 days) among patients who were discharged from the hospital than for those whose outcome was death (mean 16.0 days), and this difference was statistically significant ($p = 0.001$). Mean age of patients ($p = 0.184$) and gender ($p = 0.383$) were not associated with death.

There have been changes in the epidemiological patterns of AIDS in recent years. Trends towards the heterosexualization, feminization, ruralization, and pauperization of the epidemic are also being observed. There are increasing numbers of cases of the disease among individuals who have heterosexual intercourse, a decrease in the sex ratio, an increased number of cases among women, and progression of the epidemic to small and medium-sized cities, reaching populations with lower economic and social status[1].

According to the latest Brazilian acquired immunodeficiency syndrome/sexually transmitted diseases (AIDS/STD) Epidemiological Bulletin, published in 2012, the age group with the highest incidence of HIV infection is 35 to 39 years of age[1]. In the present study, the mean age was 40.9 years, which can probably be attributed to the fact that it can take about ten years for an HIV-infected person to develop AIDS and require hospitalization for treatment[6].

The sex ratio of 2:1 (M:F) found in this study corroborates most of the data found in the literature[1]. Since the AIDS epidemic first struck men, hospitalized patients may represent men with longer duration of infection and disease development, which may explain the higher proportion of hospitalized men[1,7,8].

Regarding marital status, there was a predominance of patients without a stable relationship, which included single, divorced, and widowed individuals, comprising 66.4% of the sample. It is assumed that this group has a greater number of sexual partners and a greater tendency towards promiscuity, thus increasing the chance of HIV infection and transmission. HIV/AIDS stigma still persists and leads to prejudice and social segregation, particularly among serodiscordant couples, which may also explain the larger number of patients without a stable relationship in the sample[9,10].

The low education level may indicate the pauperization found among the surveyed groups, which is consistent with the national profile[1,9]. This is a relevant fact, since prevention, and awareness of the modes of transmission and the effectiveness of positive treatment, is more difficult for individuals with a low education level[7,9,10].

According to the AIDS Epidemiological Bulletin, the number of HIV-unrelated deaths has increased significantly in recent years, indicating a positive impact of HAART on patient survival[1]. A recent study showed that life expectancy of HIV-infected people receiving HAART is equal to healthy persons[11]. In the present study, however, nearly half of the hospitalized patients died. This can be attributed to the lack of adherence to

TABLE 3 - Distribution of ICD codes for HIV/AIDS diagnoses among hospitalized patients in all inpatient records.

ICD*	Definitions	Number	Percentage
B20	HIV resulting in infectious and parasitic diseases	32	10.1
B20.0	HIV infections resulting in mycobacterial infection	19	6.1
B20.1	HIV resulting in other bacterial infections	19	6.1
B20.2	HIV disease resulting in cytomegaloviral disease	9	2.9
B20.3	HIV resulting in other viral infections	5	1.6
B20.4	HIV resulting in candidiasis	15	4.8
B20.5	HIV resulting in other mycoses	2	0.6
B20.6	HIV resulting in *Pneumocystis jirovecii* pneumonia	21	6.7
B20.7	HIV resulting in multiple infections	4	1.3
B20.8	HIV resulting in other infectious and parasitic diseases	3	1.0
B20.9	HIV disease resulting in unspecified infectious or parasitic disease	7	2.2
B21	HIV resulting in malignant neoplasms	1	0.3
B21.0	HIV resulting in a Kaposi sarcoma	1	0.3
B21.2	HIV resulting in other types of non-Hodgkin lymphoma	3	1.0
B22	HIV resulting in other specified diseases	17	5.4
B22.0	HIV resulting in encephalopathy	28	8.9
B23	HIV resulting in other conditions	27	8.6
B23.0	Acute HIV infection syndrome	3	1.0
B23.1	HIV resulting in (persistent) generalized lymphadenopathy	1	0.3
B23.2	HIV resulting in hematological and immunological abnormalities not elsewhere classified	1	0.3
B23.8	HIV resulting in other specified conditions	2	0.6
B24	unspecified HIV disease	94	29.9
Total		314	100.0

ICD: International Classification of Diseases; **HIV/AIDS:** human immunodeficiency virus/acquired immunodeficiency syndrome. *Some patients were associated with more than one ICD code.

pharmacological treatment, lack of knowledge about the disease and its progression, and late diagnosis, which is often performed at an advanced stage, when the patient is already weak and affected by opportunistic diseases. It should be noted that the study was conducted on hospitalized patients; these individuals were therefore in a severe clinical condition and an advanced stage of the disease. Thus, it is unwise to generalize too much from these findings to the broader population of people living with HIV.

There is a higher probability of a favorable outcome for patients who remain hospitalized for shorter periods of time. In contrast, deaths occur more frequently among those hospitalized for longer periods, which possibly indicates severe clinical conditions and an advanced stage of AIDS[7,12]. This finding is consistent with data from Pieri and Laurenti who conducted a similar study at a university hospital in Londrina, Paraná[7].

According to the literature, as well as data found in this study, infectious diseases are among the leading causes of hospitalization and death of HIV-infected patients, with a predominance of bacterial and fungal infections, pulmonary dysfunction, and central nervous system disease, such as toxoplasmosis, cerebral cryptococcosis, and others[7,12].

Tuberculosis is one of the most important AIDS-associated co-infections because it is a fully transmitted disease until treatment is started, and is often the first manifestation of immunodeficiency caused by HIV. In this study, tuberculosis was recorded as the diagnostic cause in 45 occasions, and was the most frequent infection, regardless of its form of manifestation [pulmonary or extrapulmonary tuberculosis (TB)]. There is asynergistic relationship between HIV and TB in co-infected individuals. While HIV favors the reactivation and spread of latent *Mycobacterium tuberculosis*, TB causes an increase in HIV viral replication by accelerating the natural evolution of the disease. Furthermore, HIV associated with tuberculosis leads to increased mortality, reinfection, and emergence of resistant strains, as well as greater difficulty in diagnosing sputum smear-negative cases and extrapulmonary tuberculosis[13].

Fungal infections included cryptococcosis, pneumocystosis and candidiasis. Among them, candidiasis was diagnosed on 20 occasions, accounting for 27.7% of fungal infections. Pneumocystis pneumonia (PCP) rarely affects immunocompetent people, but causes severe pneumonia in immunocompromised patients and can be the first opportunistic infection in HIV-positive patients, representing a major cause of death[14]. In this study, 37.5% of fungal infections were caused by PCP.

Since this study had a cross-sectional design with a review of electronic medical records, there were several limitations in obtaining some information, such as the time of infection, disease stage, viral load, $(CD4)^+$ T-cell count, which is important for assessing the patient's immune status and clinical condition when hospitalization is needed, and initial use of and adherence to HAART to check if the lack of adherence favors the onset of opportunistic diseases.

Considering the data presented in this study, we found that infectious and parasitic diseases were the leading causes of hospitalization among HIV-infected patients, with an emphasis on bacterial infections (tuberculosis), followed by fungal infections (PCP, candidiasis, and cryptococcosis) and parasitic infections (toxoplasmosis).

The most prevalent socioeconomic profile of hospitalized patients with HIV/AIDS was men without a steady partner, with a mean age of 40 years, and low education. Of the 230 patients included in the study, 45% died of AIDS.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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