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ORIGINAL ARTICLE

Evaluation of acute events hospital admissions in sickle cell disease pediatric patients at a reference center in Salvador, BA

Isa Menezes Lyra[1,2], Humberto Vieira Calmon de Siqueira[1], Vitor Monti Aguiar Stavola de Menezes[1]

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Abstract

Objectives: Identify the main causes of hospital admissions of patients less than 18 years old with sickle cell disease (SCD) in a reference hospital of Salvador, BA and describe the sociodemographic profile, cost and duration of admission and outpatient follow-up in our sample. **Methods:** Cross-sectional study of admissions of patients of less than 18 years old with SCD (IDC D57.0, D57.1, D57.2, D57.8) from January 2013 to June 2018, at a reference hospital in Salvador, BA. Clinical and demographic variables were extracted from patient charts, such as gender, age, hemoglobin genotype, admission cause and cost. Data was analyzed using descriptive statistics and hypothesis testing with chi-square, Students t, Mann-Whitney and Fishers exact test using the Statistical Package for the Social Sciences v. 23.0. Research was aproved by the ethics and research committee for human beings research of *Obras Sociais Irmã Dulce*. **Results:** 53 admissions were analyzed, with vaso oclusive event as the main cause (20-37.7%), followed by infection (15-28.3%) and acute thoracic syndrome (8-15.1%). 23 (73.58%) of admissions happened in the first decade of life (p=0,008). Only 4 (7.5%) of patients used hydroxiurea. 45.3% admissions happened in the fall and 11.3% in spring (p=0,04). **Conclusion:** Despite the inversion of the main causes of hospitalization, they are still the most prevalent, reinforcing the possibility of need for better adherence to prophylactic measures and better access to outpatient treatment with hydroxyurea in structured and well-distributed network.

[1] Salvador University - UNIFACS, Medical School - Salvador - BA - Brazil.
[2] Federal University of Bahia, Faculty of Medicine - Salvador - Bahia - Brazil.

Correspondence to:
Humberto Vieira Calmon de Siqueira.
Universidade Salvador. R. Dr. José Peroba, nº 251, Stiep, Salvador, BA, Brasil. CEP: 41770-235. E-mail: humbertocalmon2@gmail.com

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INTRODUCTION

Sickle cell disease (SCD) is an autosomal recessive genetic disorder that causes structural and functional changes in hemoglobin, creating a mutated variant, hemoglobin S (HbS). Thus, it is classified as homozygous alteration (SS), what It is The anemia sickle cell (HbSS), or in alteration heterozygous, represented by the associations of HbS with other variant hemoglobins, such as: HbC, HbD and interactions with thalassemias (α, β 0 and β +)[1]. It was first described in 1910 by Herrick as a disease that most often affects individuals blacks, although no being exclusive of this ethnicity[2]. At the Brazil, it is esteemed. 25,000 to 30,000 carriers of the disease, in addition to the birth of 3,500 children with SCD per year, one in every thousand live newborns[3].

The diagnosis of SCD must be performed through neonatal screening, which was implemented in Brazil through Ordinance No. 822, of the Ministry of Health, of 06/06/2001[4]. Regarding treatment, hydroxyurea is a medication available fur System Single in Health (SUS), what decreases in fence in half the number of vasoocclusive events, resulting in less need for hospitalizations and blood transfusions. As a result, greater survival and better quality of life are guaranteed for their carriers[4].

Manifestations usually start at six months of age and last for all The life, and include: events vaso-occlusive (EVO), syndrome thoracic (STA), infections, cerebrovascular accident (CVA) and splenic sequestration (SE), causing in high morbidity and repeated hospitalizations hospitals[5,6]. Still, can be acute or chronic, during different periods of the patient's development, characterizing different profiles of morbidity and mortality, being influenced by environmental factors and socioeconomic conditions[7-9].

There are few national studies on the epidemiological data of these hospital admissions, especially in Bahia, which is the largest Brazilian state in terms of number. in carriers in HbSS, due The heritage ethnic afrodescendant, and O third estate in admissions per complications gives illness, back in River in January and Sao Paulo[9]. In Salvador-BA, a retrospective study of hospital admissions of children with sickle cell disease indicated infections and vaso-occlusive events as the main causes of hospital admissions, being responsible for a longer period of hospitalization[10].

METHODS

A cross-sectional study was carried out with a convenience sample, composed of patients under 18 years of age, admitted for clinical treatment from January 2013 to June 2018 with ICD D57.0, D57.1, D57.2 and D57.8 at Hospital Santo Antônio/Obras Sociais Irmã Dulce. Patients not diagnosed in these ICD whose admission was informed by the pediatric hematology teams and the hospital epidemiology nucleus of Hospital Santo Antônio/Obras Sociais Irmã Dulce, with subsequent diagnosis, were part of the series. Patients hospitalized for surgical reasons were excluded. 83 hospitalizations were identified in the analyzed period, however, it was not possible to access 26 medical records because they did not present records with adequate data that would allow their recovery. Of the 57 records accessed, four were related to hospitalizations that did not meet the inclusion and exclusion criteria, totaling 53 records collected and analyzed.

The following acute clinical events: vasoocclusive event, acute chest syndrome, splenic sequestration, hepatic sequestration, aplastic crisis, priapism, stroke and hemolysis crises, infectious episodes, as well as their combinations were defined and treated according to the hospitalization protocol. hospitals of the Bahia Society of Pediatrics (SOBAPE)[11] used in the hospital in question. Data were collected using a structured questionnaire covering patient identification, sex, ethnicity, hemoglobin genotype, age, outpatient follow-up, antimicrobial prophylaxis, use of hydroxyurea, season of the year, cause of hospitalization, length of stay, cost of hospitalization and complications and complications what occurred during O internment. O concept in cost used was the value in reais registered in the Hospitalization Authorization - SUS for each hospitalization. The following periods were used to characterize the seasons of the year: spring (20 in March The 21 in June), summer (21 in June The 23 in September), Autumn (September 22 to December 22) and Winter (December 22 to December 20) March).

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) program, version 23.0 for Windows. Descriptive statistics were used with measures of mean frequency and standard deviation for quantitative variables with normal and median distribution and interquartile range when the variable did not meet the principle of normality. Normality analysis was performed using O test in Kolmogorov Smirnov. For verification in Statistically significant differences between the variables were used Fisher's exact test or chi-square test for qualitative variables, Student's t test for parametric quantitative variables and for non-parametric variables the test of Mann-Whitney.

Values were considered statistically significant when $p>0.05$. The research was submitted and approved by the Ethics and Research on Human Beings Committees (CEP) of Universidade Salvador - UNIFACS and Hospital Santo Antônio - Obras Sociais Irmã Dulce, and was conducted in compliance with resolution 466/12 CONEP-CNS/MS PT and the Declaration of Helsinki.

RESULTS

During the study period, 53 hospitalizations for sickle cell disease of 34 patients were recorded in the analyzed period. Regarding the patients, 19 (55.8%) were of the masculine, 15 (44.2%) of sex feminine, 16 (47%) they were of ethnicity brown, 11 (31.3%) of black ethnicity, three (8.8%) had no determined ethnicity, one white and one yellow, representing 2.9% each. The hemoglobin genotypes showed a distribution of 23 (67.6%) SS, 10 (29.4%) SC and one (2.9%) $S\beta^{+}$.

With relationship at hospitalizations (table 1), 29 (54.71%) were in patients of male, with distribution in ethnicity in 27 (50.94%) brown, 17 (32.07%) blacks, two (3.77%) were yellow, one (1.88%) was white and six (11.32%) had no determined ethnicity. O genotype most frequent he was O SS with 38 (71.6%), followed of SC with 14 (26.41%) and Sβ $^{+}$ with one (1.88%) hospitalization. The mean number of hospitalizations per patient was 2 (±1.02) and the median was 1 (1-2).

Table 1. Clinical profile of hospital admissions of children with sickle cell disease by age group in the period 2013-2018.

Hospitalization statistics	N (%)
admissions	N = 53
Male	29 (54.71%)
Hb genotype	
SS	38 (71.6%)
SC	14 (26.41%)
SB+	1 (1.88%)
Age M (IQR)	7 (1 - 11)
Male	8 (1.5 - 12)
Feminine	2 (1 - 9)
Length of stay (IIQ)	8 (5.5 - 11) days
SS	8 (5 - 11) days
SC	8 (6 - 9.75) days
SB+	13 days
M Cost (IIQ)	BRL 350.27 (301.36 - 483.23)
Total cost	BRL 25,684.33

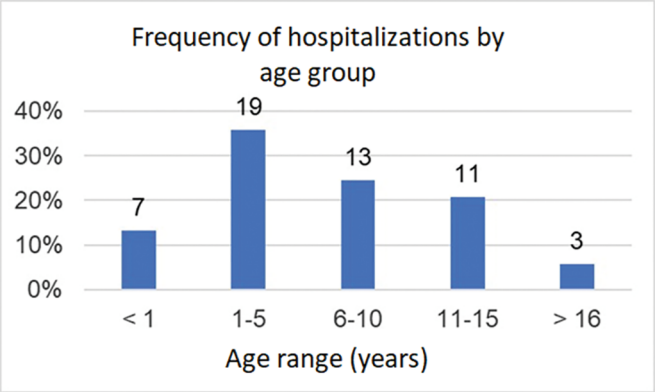
Note: Hb - hemoglobin. Data presented as median value with interquartile ranges (IIQ), absolute values and proportions in parentheses.

Still, the median age was 7 (1-11) years, with 8 (1.5 - 12) years for the sex masculine and two (1-9) for O sex feminine and The median of time permanence during hospitalization was 8 (5.5 – 11) days with variation between genotypes, SS 8 (5 – 11) days, 8 (6 – 9.75) days and Sβ $^{+}$ 13 days (p=0.404) (table 1). In addition from that, O cost median of hospitalizations was 350.27 reais (301.36 – 483.23) and the total cost was 25,684.33 reais.

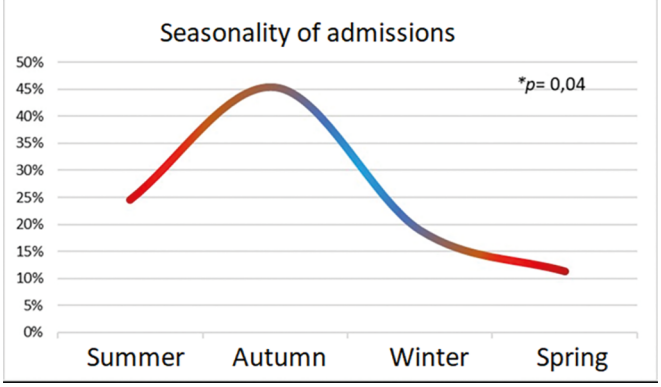
As for outpatient follow-up, 34 (79.1%) patients had regular follow-up, and 21 (80.7%) of the patients up to 5 years of age did use in prophylaxis antimicrobial with penicillin v. Only 4 (7.5%) were using hydroxyurea at admission hospital.

The distribution per range age he was in seven (13.2%) patients <1 year in age, 19 (35.8%) aged between 1 and 5 years, 13 (24.5%) aged between 6 and 10 years, 11 (20.8%) aged between 11 and 15 years and three (5.7%) aged > 16 years (Graph 1), with 73.58% of hospitalizations occurring in patients in the first decade of life, with p = 0.008.

Most hospitalizations occurred during the autumn (45.3%), with the lowest incidence during The spring (11.3%), with p =0.04, as illustrated at the graph 2.

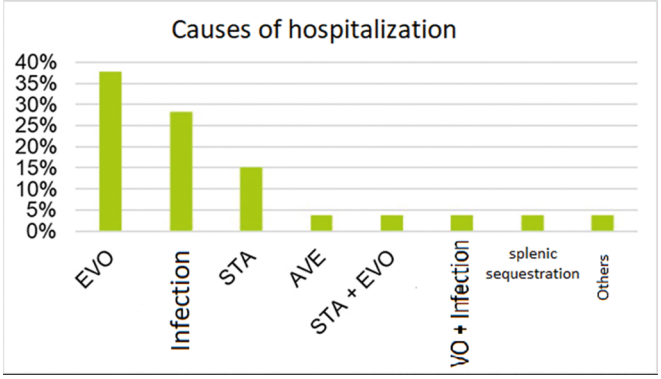


Graph 1. Frequency of hospitalizations of children with sickle cell disease by age group in the period 2013-2018.



Graph 2. Seasonal frequency of hospital admissions of children with sickle cell disease by age group in the period 2013-2018.

The most frequent cause of hospital admission was EVO alone (37.7%), followed by infection (28.3%) and STA (15.1%). EVO was present in 24 (45.2%) of hospitalizations and infections in 25 (47.1%), also considering the STA as infectious causes, which alone account for 10 (18.8%) of the causes of hospitalization. Others causes, as BIRD and kidnapping splenic were responsible per two (3.8%) of hospitalizations, each, and others causes per two (3.8%) each (graph 3).



Graph 3. Relative distribution of causes of hospitalization for sickle cell disease in the period 2013-2018.

In assessing the length of hospital stay due to causes of hospitalization, stroke was the cause that had the longest duration of hospitalization (12 days), followed by isolated STA and infection+EVO (10.5 days), STA+EVO (9 days), EVO (8.5 days), splenic sequestration (5.5 days) and infection (5 days), with p =0.009. Also, in 10 hospitalizations there was an occurrence of nosocomial infection, with pneumonia being the most frequent with 3 cases (30%).

Regarding the age of hospitalization, isolated infection and infection combined with EVO occurred mainly in the lowest age group (one year), followed by splenic sequestration. (1.5 years), STA (3 years), EVO (9 years), STA with EVO (10.5 years) and AVE at 15 years.

DISCUSSION

The proportion in cases of sex masculine he was similar The described at national literature[9]. Still, The ethnicity most prevalent in the hospitalizations he was The brown, in disagreement with a study from Minas Gerais, which indicates the majority of black patients, although it is a self-declared variable[12]. Also, the frequency of hemoglobin genotypes is similar to other studies, with most patients with sickle cell anemia (SS), followed by SC and Sβ minor or major[5,9,13-15]. The median age of hospitalized children was similar to other described series[16–18].

As for the length of hospital stay, two studies described lower results, six days[14] and five days[9]. In this context, it is possible to suggest that the lack of preparation of the multidisciplinary team on the diagnosis and initial management of complications gives illness, extend O period in internment. At the however, he was smaller compared to the only study of a similar nature in Salvador that described twelve days[10], suggesting that, despite being insufficient, the local development of health policies, especially antimicrobial prophylaxis and vaccination, have improved the morbidity profile of these patients. Even so, it should be taken into account that the length of hospital stay influences an increased risk of nosocomial and other infections. complications related to the procedures hospital, O what onera even more the system health.

O cost medium reported at literature lies in systems monetary and in different economies, making comparisons difficult. However, it is possible to identify a payment gap in the SUS table where the cost per hospitalization was small, even in the longest hospitalization. Thus, hospital resources are harmed, which in the long term can influence the quality of patient care. Also, when analyzing the total cost of hospitalizations in this study, it is possible to infer the impact that hospitalizations have on the health system.

Although most patients are regularly followed up, an underutilization of hydroxyurea was identified, suggesting the reason for the persistence of EVO as one of the main causes of hospitalization. In this context, it is necessary not only to expand these patients' access to the specialized health network for a correct indication and use of medication, but also distribution egalitarian of that access to the patients residents at the interior of state from Bahia.

There was a higher prevalence of hospitalizations in the first decade of life, corroborating the expected clinical course based on the natural history of the disease in children, which has a high incidence of acute events, largely responsible for hospital admissions[9].

When analyzing the trend of hospitalization by season of the year, a character was found seasonal, Where The larger frequency in hospitalization occurred at the autumn and smaller in the spring. In this context, only one study in the literature also evaluated the seasonality of hospitalizations, with data similar to those found in our study[14].

EVO was the main cause of hospital admissions in this analysis, converging with several data described in the literature[13,14,17–24], followed by infection and ACS. Although there is no agreement on the frequencies, the causes of hospitalization follow the same order of prevalence as in studies carried out in Barbados[13], the United States of America 13 and Australia[15].

Comparing with national data, infections were the main cause of hospital admissions (55.6%) and EVO followed (35.3%)[10]. With this, it is possible to infer a probable positive effect of antibiotic prophylaxis in the prevention of bacterial infections, thus reducing the number of hospitalizations for infectious causes, despite the fact that a study demonstrated the low adherence of patients to antimicrobial prophylaxis[25].

This study had as limitations the difficulty of accessing medical records. of patients, in addition gives bad quality in fill, O what contributed tightly to the reduction gives sample analyzed. With that, it is evident The importance in a computerized and integrated medical record system, in order to ensure adequate storage, availability of access and collection, as well as quality of filling.

Despite the reversal of the main causes of hospitalization, they are still the most prevalent, which reinforces the need for better adherence to prophylactic measures and better access to treatment. outpatient treatment with hydroxyurea in a structured and well-distributed network. Also, greater dissemination of knowledge to family members and the population is part of comprehensive care for children with illness. sickle cell.

The course of the disease, especially in a scenario where it is neglected, generates a high cost for O system in health and great impact at quality in life of these patients, confirming that it is a public health problem in the Brazil.

That said, carrying out studies to assess adherence to treatments and the availability of access to assistance is of utmost importance given the scarcity of national data and regional.

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