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RESEARCH

HOSPITALIZATIONS DUE TO PRIMARY PEDIATRIC CARE SENSITIVE CONDITIONS IN THE *DISTRITO FEDERAL*: AN EXPLORATORY ECOLOGICAL STUDY

INTERNAÇÕES POR CONDIÇÕES SENSÍVEIS À ATENÇÃO PRIMÁRIA EM PEDIATRIA NO DISTRITO FEDERAL: UM ESTUDO ECOLÓGICO EXPLORATÓRIO

HOSPITALIZACIONES POR CONDICIONES SENSIBLES A LA ATENCIÓN PEDIÁTRICA PRIMARIA EN EL DISTRITO FEDERAL: UN ESTUDIO ECOLÓGICO EXPLORATORIO

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ABSTRACT

Objective: to characterize the hospitalizations of children from zero to nine years old for primary care sensitive conditions in a regional hospital in the Federal District (Distrito Federal, DF), Brazil, between 2008 and 2017. **Method:** this is an ecological, exploratory study in which the hospitalizations for primary care sensitive conditions (HPCSCs) were described considering the following variables: group of causes and diagnoses, gender, age group, municipality of residence, deaths and cost. Data was collected through the Hospital Notifications System of the Unified Health System, based on the Brazilian List of Hospitalizations due to Sensitive Conditions. In addition to characterizing the HPCSCs according to the variables described, the annual HPCSC rates were calculated for the age groups of children <5 years old and from 5 to 9 years old and a chi-square test was performed. **Results:** they indicate the total of 7,037 HPCSCs in children from zero to nine years old during the study period. The HPCSC rates for zero to four years old increased 35.43% and, in the five to nine years old age group, they increased 69.56% in the period. Asthma, bacterial pneumonias and infectious gastroenteritis and complications were the first three causes accounting together for 52.51% of hospitalizations. Total spending was estimated at R$2,805,551.53, with an increase of 10.23% in expenses, comparing the first with the last year of the series. The largest expense was with asthma, disbursing 27.93% of the total. **Conclusion:** in this sense, decreasing HPCSCs in children is important to improve the population's health levels, to better manage the system, and to reduce hospital expenses.

Keywords: Hospitalization; Primary Health Care; Child Health.

RESUMO

Objetivo: *caracterizar as hospitalizações de crianças de zero a nove anos por condições sensíveis à atenção primária, em hospital regional no Distrito Federal, entre 2008 e 2017.* ***Método:*** *trata-se de estudo ecológico, exploratório, no qual foram descritas as ICSAPs considerando-se as seguintes variáveis: grupo de causas e diagnósticos, sexo, faixa etária, município de residência, óbitos e custo. Os dados foram coletados por meio do Sistema de Informações Hospitalares do Sistema Único de Saúde, tomando por base a Lista Brasileira de Internações por Condições Sensíveis. Além de caracterizar as ICSAPs segundo as variáveis descritas, foram calculadas as taxas anuais de ICSAP nas faixas etárias de crianças <5 anos e de cinco a nove anos e realizado teste qui-quadrado.* ***Resultados:*** *indicam o total de 7.037 ICSAPs em crianças de zero a nove anos, no período do estudo. As taxas de ICSAP zero a quatro anos aumentaram 35,43% e na faixa etária de cinco a nove anos o aumento foi de 69,56% no período. Asma, pneumonias bacterianas e gastroenterites infecciosas e complicações foram as três primeiras causas que, juntas, somaram 52,51% das internações. O gasto total foi estimado em 2.805.551,53 reais, sendo observado aumento de 10,23% nos gastos, comparando-se o primeiro com o último ano da série. O maior gasto foi com asma, desembolsando 27,93% do total.* ***Conclusão:*** *esse sentido, diminuir as ICSAPs em crianças, é importante tanto para melhorar os níveis*

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de saúde da população, gerindo melhor o sistema, quanto para reduzir gastos hospitalares.

Palavras-chave: *Hospitalização; Atenção Primária à Saúde; Saúde da Criança.*

RESUMEN

Objetivo: *caracterizar las hospitalizaciones de niños de cero a nueve años por condiciones sensibles a la atención primaria en un hospital regional del Distrito Federal, entre 2008 y 2017.* ***Método:*** *estudio exploratorio ecológico que describió las HCSAP considerando las siguientes variables: grupo de causas y diagnósticos, género, grupo de edad, municipio de residencia, defunciones y costo. Los datos fueron recogidos a través del Sistema de Información Hospitalaria del Sistema Único de Salud, basado en la Lista Brasileña de Hospitalizaciones por Condiciones Sensibles. Además de caracterizar las HCSAP de acuerdo con las variables descritas, se calcularon las tasas anuales de HCSAP para el grupo de edad de niños <5 años y de 5 a 9 años, y se realizó una prueba de chi-cuadrado.* ***Resultados:*** *indican el total de 7.037 HCSAP en niños de cero a nueve años, durante el período de estudio. Las tasas HCSAP de cero a cuatro años aumentaron en un 35,43% y en el grupo de edad de cinco a nueve años el aumento fue del 69,56% en el período. El asma, las neumonías bacterianas y la gastroenteritis infecciosa y las complicaciones fueron las tres primeras causas que juntas representaron el 52,51% de las hospitalizaciones. El gasto total se estimó en R$ 2.805.551,53, con un aumento del 10,23% en los gastos, comparando el primero al último año de la serie. El mayor gasto fue con asma: el 27,93% del total.* ***Conclusión:*** *en este sentido, la disminución de las HCSAP en los niños es importante para mejorar los niveles de salud de la población, para administrar mejor el sistema y para reducir los gastos hospitalarios.*

Palabras clave*: Hospitalización; Atención Primaria de Salud; Salud del Niño.*

INTRODUCTION

Primary Health Care (PHC) acts as care coordinator and is capable of solving about 80% of the population's health needs. With the increase in coverage by the Family Health Strategy (FHS) in the Brazilian territory, access to health services needs to be evaluated, so that data can be studied and proposals implemented to improve the Unified Health System/*Sistema Único de Saúde* (SUS). Hospitalizations for primary care sensitive conditions (HPCSCs) function as the hospital indicator capable of revealing the situation of PHC, as well as the health profile of the population.[1]

The importance and centrality of PHC to increase the population's access to the health services has been verified since the first publication of the National Primary Care Policy/ *Política Nacional de Atenção Básica* (PNAB) in 2006 and its subsequent revisions of 2011 and 2017. PHC stands out as one of the main responsible areas for the consolidation of the principle of completeness established by the Brazilian Federal Constitution of 1988.[1]

In the process of building an effective health system, evaluation is an essential point for improving the health responses of a given population. Even recognizing the progress in PHC and FHS coverage, there are still persistent problems in access, quality, continuity of care and resolution of services.[2]

In this sense, the search for methods, indicators and technologies that can evaluate the quality of PHC results in evaluation studies, which contribute to the definition of priority lines and programs, as well as health policies, allowing the qualification of attention to the health offered and the search for better results in PHC performance.

Assuming that a good PHC offered and accessed at the right time can prevent or reduce the frequency of hospitalizations for some health conditions, high rates of hospitalization due to PCSCs may indicate low access and use or provision of low quality services, evidencing that the appearance of any percentage should be a worrying factor for the health care system.[3]

Thus, studies are warranted to verify the behavior of HPCSCs in a given territory as an indirect measure of access and effectiveness of PHC, as these may contribute to measure the quality of the health system and may highlight the impact interventions, such as changes in the care model from the implementation of the FHS and those arising from the expansion of funding. In this sense, this study seeks to answer the following question: what is the profile of HPCSCs in Pediatrics in a regional hospital in the *Distrito Federal*? It aims to characterize hospitalizations due to conditions sensitive to primary care in children aged 0-9 years old in the regional hospital of an administrative region of the *Distrito Federal*, during 2008-2017.

METHOD

This is an exploratory ecological study, having as a unit of analysis the pediatric population hospitalized for primary care sensitive conditions (PCSC)s in a regional hospital in DF, between 2008 and 2017. It is characterized as exploratory and ecological for tracing the occurrence of the disease/condition sensitive to PHC in the pediatric population, in a well delimited area: HRC/DF. Ecological studies provide information related to the population as a whole and not to the individual, besides allowing for a comparative analysis of global variables, almost always through the correlation between indicators of living conditions and indicators of health status.

The regional hospital is located in the western health area of the *Distrito Federal*, has 400 beds and an outpatient clinic with 26 specialties. The first-aid post is structured in three emergency areas: Pediatrics, Gynecology and Obstetrics and general adult emergencies. Still in relation to the local health system, the region has 16 Basic Health Units/ *Unidades Básicas de Saúde*(UBSs), with 79 family health teams, covering 100% in 2018.

The period and place of the study were defined according to the publication of the Brazilian list of HPCSCs in 2008 and

the last year of the closure of the Hospital Notifications System/ *Sistema de Informação Hospitalar* (SIH) of the SUS database and for being an action field of the University of *Brasília*.

The selection of HPCSCs was based on the Brazilian List published by the Ministry of Health composed of 19 groups of causes, with 74 diagnoses classified according to the Tenth Revision of the International Classification of Diseases (ICD10). Data was obtained from the Hospital Notifications System (SIH), availed by the Department of Informatics of the Unified Health System (DATASUS).

To identify the HPCSCs in the SIH/SUS, a definition (DEF) file was generated for tabulation based on the selection of the causes of hospitalizations through the respective codes. The Tabwin application – Version 3.5 – developed by DATASUS from the Ministry of Health was used.

The following variables were adopted: groups of causes and diagnoses defined in the Brazilian list of HPCSCs; age group: the following age groups were considered among those predefined in the SIH/SUS: less than one year old, one to four years old and five to nine years old; gender: male, female and unknown. The unknown item was included because it is an alternative in the hospitalization authorization (HA); deaths: the number of deaths due to HPCSCs was verified during the study period; municipality of residence; expenses: the values corresponding to hospitalizations due to HPCSCs recorded in the SIH/SUS in the period were analyzed.

For processing and analysis of data, descriptive statistics were used as frequency, percentages and variation. Chi-square was also calculated to verify the association among variables related to HPCSCs, with a confidence interval of $p<0.05$, and HPCSC rates in the age groups from zero to four years old and from five to nine years old, using for the calculation of the intercensity projections of the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE) for the years 2008 to 2017. Statistical analysis was performed by the R *Project* program, version 3.4.0.

This research was conducted in accordance with the ethical standards established by Resolution Nº 510 of April 7th, 2016 of the National Health Council/Conselho Nacional de Saúde-CNH, which provides in its Article 1, single paragraph, that researches conducted from publicly accessible information will not be recorded nor evaluated by the CEP\CONEP system.

RESULTS

During 2008 and 2017, the SIH/SUS recorded the occurrence of 310, 412 hospitalizations in the DF in children aged zero to nine years old, 27,650 (8.90%) in the studied hospital, of which 7,037 (25, 45%) were due to PCSCs. It is observed that there was a 60.19% increase in the frequency of HPCSCs from 2008 to 2017.

Considering the period studied, the three most frequent HPCSCs together accounted for 52.51% of the hospitalizations, being asthma, with 22.34% (n=1572) of the cases, followed by bacterial pneumonia, 15.45% (n=1087), and infectious gastroenteritis and complications, 14.72% (n=1036) (Table 1).

Table 1 - Characterization of the HPCSCs according to age group, gender and group of causes and diagnoses. *Distrito Federal*, Brazil, 2008-2017

Characteristic	Category	n	%	p-value
HPCSC cause groups and diagnoses	1. Preventable diseases due to immunization and sensitive conditions	96	1.3	
	2. Infectious gastroenteritis and complications	1036	14.7	
	3. Anemia	9	0.1	
	4. Nutritional deficiencies	48	0.6	
	5. Ear, nose and throat infections	247	3.5	
	6. Bacterial pneumonias	1087	15.4	
	7. Asthma	1572	22.3	
	8. Pulmonary diseases	859	12.2	
	9. Hypertension	13	0.1	
	10. Angina	0	0	
	11. Cardiac insufficiency	25	0.3	
	12. Cerebrovascular diseases	70	0.9	
	13. Diabetes *mellitus*	57	0.8	
	14. Epilepsies	656	9.3	
	15. Kidney and urinary tract infection	601	8.5	
	16. Infection of skin and subcutaneous tissue	539	7.6	
	17. Inflammatory disease in female pelvic organs	3	0.04	
	18. Gastrointestinal ulcer	14	0.2	
	19. Diseases related to prenatal care and delivery	105	1.4	
	TOTAL	**7037**	**100**	
Age group	<1 year old	2436	34.6	p<0.001
	1 to 4 years old	3019	42.9	p<0.001
	4 to 9 years old	1582	22.4	p<0.001
	TOTAL	**7037**	**100**	
Gender	Female	3237	46	p<0.001
	Male	3800	54	p<0.001
	TOTAL	**7037**	**100**	

Source: SIH/SUS.

By analyzing these three groups, it was verified that, in 2008 alone, the number of hospitalizations due to infectious

gastroenteritis and complications (26.01%) surpassed asthma (9.36%) and bacterial pneumonia (21.35%). In 2009, 2010 and 2011, bacterial pneumonias outperformed asthma. Since 2012, asthma was prevalent in all years. The least frequent HPCSC groups were inflammatory diseases in female pelvic organs: 0.04% (n=3), anemia: 0.13% (n=9) and hypertension: 0.18% (Figure 1).

Observing the most frequently reported HPCSCs, the most increasing ones were hospitalizations due to asthma (147%), lung disease (424%), epilepsy (233%) and kidney and urinary tract infection (138%). Regarding the age groups, the most hospitalized due to PCSCs in absolute numbers was one to four years old, according to Table 1. In the age group younger than one year old, the predominant causes of hospitalizations for PCSCs were pulmonary diseases (7.29%), asthma (6.61%) and bacterial pneumonia (5.44%). In the age group of one to four years old, the most common diseases were asthma (9.71%), bacterial pneumonia (7.72%) and infectious gastroenteritis and complications (7.62%). In the age group of five to nine years old, the most incident diseases were asthma (6.03%), infectious gastroenteritis and complications (3.58%) and epilepsy (2.57%). In the chi-square test, a p-value<0.001 was found, which verifies a positive association, that is, depending on the HPCSC, there are more predominant age groups.

Analyzing the HPCSCs according to gender, it was observed that there were more hospitalizations in males compared to females (Table 1). In the chi-square test performed to verify the association between HPCSCs and gender, it was found that the p-value was <0.001, indicating a positive association, that is, depending on gender, there were more HPCSC groups that were more prevalent, for males being asthma: 12.87% (n=906), bacterial pneumonia: 8.33% (n=906) and lung disease: 7.63% (n=537). In females, asthma was the first, with 9.46% (n=666), followed by infectious gastroenteritis and complications with 7.29% (n=513) and by bacterial pneumonia with 7.12% (n=501).

The analysis of the hospitalization rates due to HPCSC between the age groups of zero and four years old and from five to nine yearsold in Ceilândia, for the period studied, taking into account the initial and final years, revealed that the group from zero to four years old presented the highest rates. These rates increased from 20.6 in 2008 to 27.9 per 10,000 inhabitants in 2017, thus showing an increase of 35.43%. In the age group of five to nine years old, hospitalizations increased from 4.6 to 7.8/10,000 inhabitants, an increase of 69.56% (Table 2).

Among the places of residence, Brasília appears as the one that originated the most hospitalizations, without distinction among the administrative regions (AR) that constitute the *Distrito Federal*, with 95.73% (n=6,737).

There was a total of 17 deaths, representing 0.24% of the 7,037 hospitalizations due to HPCSCs, distributed as follows: 2008 (n=2), 2010 (n=5), 2011 (n=5), 2012 (n=2), 2014 (n=2) and 2017 (n=1). The leading cause of death was bacterial pneumonia (n=5), followed by infectious gastroenteritis and complications, lung disease, heart failure, and cerebrovascular disease, with two deaths each. Preventable diseases due to immunization and sensitive conditions, asthma, hypertension and epilepsies recorded one death each.

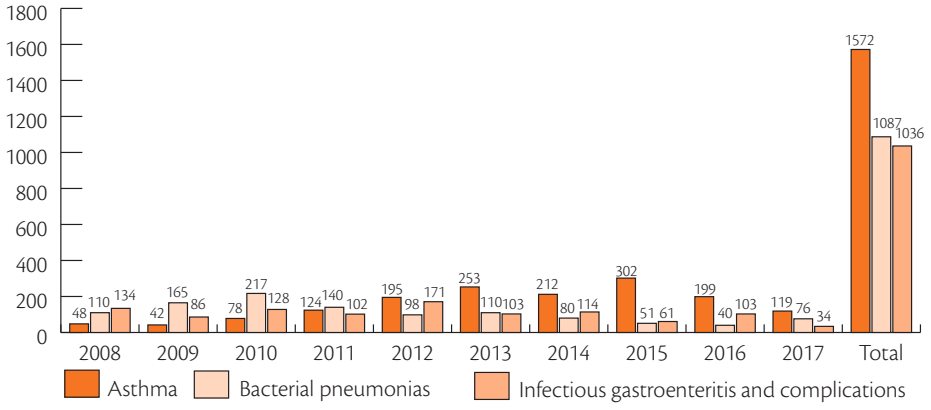

Figure 1 - Frequencies of asthma, bacterial pneumonia, and infectious gastroenteritis. Three major HPCSCs per year in children 0-9 years old, *Distrito Federal*, Brazil, 2008-2017.
Source: SIH/SUS

Table 2 - Hospitalization rate due to primary care sensitive conditions (HPCSCs) in children aged 0 to 9 years old (per 10,000 inhabitants) and by age group, *Distrito Federal*, Brazil, 2008-2017

Age group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0 to 4 years old	20.6	21.9	27.3	26.2	29.4	29.3	26.9	25.4	29.6	27.9
5 to 9 years old	4.6	4.3	8.3	8.5	11.1	10.3	7.6	7.5	8.6	7.8

Source: SIH/SUS; IBGE.

The age groups of <1 year old and from one to four years old registered eight deaths each. Comparing the deaths registered by gender, females had nine deaths, while males, eight.

Regarding the expenses with HPCSCs in children from zero to nine years old in the period studied, the regional hospital totaled R$ 2,805,551.53, representing 13.3% of all expenses with children from zero to nine years old. The diseases with the highest costs in the period due to HPCSCs were asthma with 27.93%, bacterial pneumonia with 25.58%, and infectious gastroenteritis and complications with 12.38%. These three diagnostic groups together account for 65.89% of the total expenses on HPCSCs.

DISCUSSION

This study revealed that a quarter of all the hospitalizations that took place from 2008 to 2017 in the pediatric age group from zero to nine years old in the regional hospital were due to HPCSCs. Knowing that the analysis of the evolution of the HPCSCs contributes to indirectly assess the quality of the health system, especially primary care, it is necessary to observe the absolute numbers of hospitalizations due to HPCSCs, as well as the rates, since the latter can be used comparing them with other studies.[4]

In the analyzed years, there was an increase in HPCSC rates. In the age group of under five years old, this increase was 28.97% from 2008 to 2017, while in the 5 to 9 years old age group the increase was 38.87% for the same period. These results differ from some studies that were similar in methodology and use of rates that reported decrease in HPCSC rates in children, in most cases.[5,6]

For comparison purposes, it is observed that in addition to the divergence in the approach of age groups, in studies on HPCSCs there is a lack of research addressing the main groups of causes of hospitalization in different periods of childhood. This consideration is necessary because, in each phase of growth and development, children may have a different profile in terms of health and disease.[7]

In this study, there were high records of hospitalization for asthma, especially in the age groups younger than one year old and from one to four years old, with an increase in hospitalizations for this cause of 147% comparing the initial year of the study, 2008 and its final year, 2017. Although its prevalence varies widely among countries in the world, there has generally been a tendency in increase the frequency in the last three decades, both in Brazil and in developed countries.[8]

Brazil has over 120,000 asthma hospitalizations per year. However, according to a study from 2017,[9] there was a 36% reduction in these hospitalizations in the analyzed period. The authors state that it is difficult to explain the reduction precisely because it depends on several factors. However, the implementation of a national public health policy by the Ministry of Health in 2009, whereby asthma drugs became more accessible and freely supplied in Brazil, may have contributed.[9] Constituted as a chronic noncommunicable disease, asthma fits into the Brazilian epidemiological situation called the triple burden of disease. This triple burden involves at the same time an unfinished agenda of infections, malnutrition and reproductive health problems; the challenge of chronic diseases and their risk factors, among other factors.[10]

PHC works closely with families in the management of mild and moderate cases of asthma. Thus, together they achieve better treatment adherence and more symptom control, in order to decrease the number of hospitalizations and increase the quality of life. Family physicians and unit staff should continue to follow up severe persistent cases and the ones which are difficult to control, and if they are unsuccessful in therapeutic attempts, there are outpatient clinics in the DF to receive and follow-up cases. More severe patients need joint follow-up with a referral center.[11]

The direct and indirect costs that asthma generates for society are still high,[9] as observed in this study. As the first group of causes, asthma accounted for 22.34% of the HPCSCs and 27.93% of the costs in the period. During the period, R$ 6,999,283.37 were spent on hospitalizations due to HPCSCs in asthma in the *Distrito Federal*. In the regional hospital, R$ 783.831,65 were spent in the same period from 2008 to 2017.

The same authors[9] also analyze that, from 2008 to 2013, there were about 1million hospitalizations for bronchial asthma in Brazil, at a cost of USD 170million. Asthma remains a major global public health problem, with high direct and indirect costs that burden both patients and public health systems.

Bacterial pneumonias appear in the study as the second group in the total causes of hospitalization, with a frequency of 15.45%, as in the study where it remained in the age groups from zero to four years old and from five to nine years old in the second higher frequency.[6] In a survey conducted in 2017 in the state of *Paraíba*, the percentage of records for bacterial pneumonia was 59.38% in children under five years old.[12] For other authors, in 2012, in the state of *São Paulo*, analyzing the age groups younger than one year old and from one to four years old, the group of bacterial pneumonia was the most hospitalized in the years of the study.[13]

Despite the significant reduction in the disease burden in recent decades, pneumonia remains the leading cause of childhood morbidity and mortality, causing negative impacts in developing countries and regions of high social inequality where resources are scarce. Estimates suggest that, due to serious clinical complications, 7% to 13% of all the known cases of pneumonia require advanced care in a hospital setting. Often, the most severe cases evolve to death, especially in the age group of the most vulnerable children under one year old, a

factor comparable to this study, in which bacterial pneumonia was the major cause of death.[14]

In the face of pneumonia control, PHC needs to focus on early diagnosis, treatment and interventions aimed at reducing exposure to risk factors, increasing exposure to protective factors associated with pneumonia. One of the determining factors in PHC performance in relation to pneumonia is its role in vaccine coverage. From January to April 2018, in the *Distrito Federal*, the coverage for the 10-valent pneumococcal vaccine was 87.9%, the PNI target being 95%. It is important to take into account factors related to routine communication and health care provided to children, such as vaccination, along with caregiver follow-up, as these have a direct impact on child health.[15]

Expenses with hospitalizations for bacterial pneumonia are also worth mentioning, as they increased over time and were the second largest expense among the cause groups in this study. This increase in the costs was also demonstrated in a study conducted in *Santa Catarina*, in which the group of bacterial pneumonia ranked third among the causes of hospitalization expenses.[16]

Among the conditions observed in this study, hospitalizations for infectious gastroenteritis and complications were the third most prevalent, with 14.72%. A high reduction of -294% is highlighted, comparing 2008 with 2017. In a study also conducted in the DF, in the same area covered by this study, infectious gastroenteritis constituted the most frequent complications among children aged one to four years old.[17]

The high representativeness of hospitalizations for infectious gastroenteritis and complications, as found in this study, in populations living in regions where there is a higher concentration of poverty is a constant finding in investigations conducted in the country. And it is well known that poor socioeconomic conditions increase the risk of diarrhea.[18]

In this study, male children were hospitalized 54% more than females, with 46%. There is evidence that morbidity and the consequent higher demand for health services is more commonly reported in males compared with females up to 10 years old.[19] For males, the age groups younger than one year old and from one to four years old obtained 55.1 and 53.2%, respectively, a result similar to that found in this study.11 Most studies that discuss the predominance of HPCSCs in males are related to all age groups, and not exclusively to pediatric.

The cause group due to kidney and urinary tract infection stood out for a higher proportion in females, a result that converges with other reports in the literature, due to anatomical conditions.[20]

Despite the data on the origin, as to the municipality of residence has been *Brasília* (95.73%), the system does not allow identifying the health region from which the child proceeded, making it impossible to specifically analyze the reference UBS, as well as the work developed by the FHS teams. This information is essential because, as stated in a 2009 publication,[3] the use of hospitalizations due to PCSCs as an indicator of access and quality of primary care has been used in several countries and increased sensitivity, that is, the more accurate and specific this data, the better it will be to identify problems and the better will be the measures for the referral of actions in PHC.[3]

The deaths recorded were not observed in all years of the study and the predominant cause of death within the cause groups was bacterial pneumonia.

Similar results were found in a study conducted in the state of *Rio de Janeiro*, in which the cause group of pneumonia was among the three leading causes of death.[21] In other surveys, such as the one conducted in *Mato Grosso* between 2007 and 2010, 253 deaths of children under five years old from pneumonia were recorded, representing 6.7% of all deaths. And specifically in Cuiabá, pneumonia was responsible for 5.1% of the deaths in this age group between 2007 and 2010.[6]

Saving expenses on avoidable hospitalizations is a concrete alternative to reversing and directing such resources to increase the effectiveness of primary health care itself.[22]

Therefore, the occurrence of preventable hospitalizations burdens the health budget and wastes the resources that could be used to fund other health actions in PHC. They are expenses incurred in the outpatient and hospital sector, although those with the FHS are a priority. Given this, it can be stated that the reduction in the number of HPCSCs is a strategic issue in the face of insufficient resources, and may also represent savings for the health system and the possibility of reinvestment in these aforementioned priority sectors, which coordinating health care can yield numerous benefits to the system.[5]

In the *Distrito Federal*, Family Health Strategy teams coverage during the study period increased from 5.6% in 2008 to 44% in 2017. Low FHS population coverage leads to reduced access to the health services, maintenance of the care perspective focused on the disease and less emphasis on promotion and prevention activities. Therefore, nurses work with the professionals of the FHS teams, having to be prepared to deal with these problems, so that they can offer the best treatment. When there is a small number of health professionals in PHC, there is an increase in hospitalizations due to PCSCs. Thus, hospitalization represents the outcome of itineraries where there was no resolution of the health problem at the primary level.[23]

An appropriate health care for children, whether due to infectious or respiratory diseases or to chronic disorders, is under the care of the Nursing professionals who provide direct assistance to children and caregivers, so they need help and care to fit their context, both during hospitalization and after discharge. Among the Nurses' attributions in the Integrated Care of the Prevalent Childhood Diseases/*Atenção*

Integrada às Doenças Prevalentes na Infância, AIDPI) strategy, conducting Nursing consultations to monitor growth and child development is included, as well as scheduled activities and attention to spontaneous demand.[24]

As limitations of this study the quality of the secondary data provided by SIH/SUS stands out, besides recording only the hospitalizations performed within the scope of the SUS, partially portraying the reality of the hospitalizations that occurred. Moreover, the calculation of hospitalization rates per inhabitant depends on population data which, for all years of the study period, was used from the 2010 census population and, therefore, is subjected to calculation deviations. On the other hand, these aspects do not invalidate the use of the generated information, given that they have the ability to promote the improvement of the quality of care provided in the future, as long as the objective of returning it to the managers and professionals from the SUS involved with health production and management.[25]

Also related to the information system used, the inaccuracy of data about the municipality of origin, which is very important for PHC evaluation, limited the verification of the basic health unit responsible for users, as well as its evaluation and possible future referrals.

CONCLUSIONS

The increase in hospitalizations due to PCSCs in the health region of the study may reveal the fragility of primary care because, even considered a solution doorway for about 80% of the main demands of the population, it is still unable to meet the needs of users. Despite the continued increase in FHS population coverage at the study site, the path of preventable hospitalizations has not decreased, as is commonly described in the literature.

The increase in hospitalizations due to PCSCs in the child population was strongly determined by the growth of chronic diseases such as asthma. It was observed, however, that the main causes of HPCSCs follow what has been happening nationally, both in the predominant groups of causes, and mainly affecting children under four years old, emphasizing the importance of developing studies aimed at this population, which also stands out worldwide for its greater involvement with HPCSCs.

The findings of this research can be used as a baseline in the DF for future studies, through the changes that are currently occurring in the local health system, with a strong investment in primary health care. These results describe the behavior of hospitalizations in children, which could be avoided through work done in PHC and in communion with public authorities. This study may contribute to the characterization of these hospitalizations in children, emphasizing that no studies characterizing the HPCSCs in children in the DF were identified. Among the most common cause groups (asthma, bacterial pneumonia and infectious gastroenteritis), it has been verified that these problems can be tackled by the FHS teams combined with the improvement of social and environmental problems, such as drinking water, urban pollution, and sewage treatment.

This research can be used as a comparison before the full deployment of the FHS teams, as well as planning for the costs of avoidable hospitalizations, such as asthma, with high direct and indirect costs to patients and the public system.

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