

HOSPITALIZATIONS CAUSED BY CHRONIC DISEASES AMONG CHILDREN UNDER THE AGE OF FIVE IN THE PUBLIC HEALTH SYSTEM IN BRAZIL AND IN RIO GRANDE DO SUL

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ABSTRACT

Objective: to identify rates of hospitalizations from chronic diseases among children under the age of five from 2010 to 2015. **Method:** Ecological study using a time series trend. Data were collected from the Hospital Information System of the Brazilian Public Health System between January and March 2016. After data were digitalized, descriptive analysis was performed using EpiInfo. **Results:** The frequency of hospitalizations caused by chronic diseases among children younger than 5 years old remained between 10.8% and 11.2% in Brazil and 13.8% to 16.1% in Rio Grande do Sul. Respiratory disorders were the most prevalent, both in the state of Rio Grande do Sul and at the national level. Asthma was the most prevalent reason for hospitalization. **Final considerations:** Even though, in general, the causes of hospitalizations tend to remain stable, emphasis is placed on the high prevalence of chronic conditions in childhood and their impact on the lives of children and their families.

Keywords: Chronic disease. Child. Child health. Hospitalization.

INTRODUCTION

The implementation of public policies with actions and measures intended to improve the problem-solving capacity of health services, combined with technological advancements resulted in decreased child mortality and changed the epidemiological profile of this population, with an increase in chronic diseases and a decline in acute conditions⁽¹⁾.

Chronic conditions have various implications in the lives of people. Studies show that individuals with chronic diseases are twice more likely to be hospitalized when compared to their healthy counterparts⁽²⁾.

Identifying the prevalence of hospitalizations caused by chronic diseases among children under the age of five may contribute to establishing a profile of chronicity in this age group. It is enable the development of plans intended to prevent the worsening of these diseases to avoid hospitalizations, or

when that is not possible, to guide the actions of the health team to implement more effective care within the hospital setting, minimizing the consequences of hospitalization⁽³⁾.

This study is justified by the relevance of identifying the main diseases responsible for hospitalizations during childhood, which is one of the gaps in knowledge concerning this population. There is also a lack of official data on the prevalence of chronic diseases during childhood. Another important aspect of this study is that it meets the 4th axis of the *Política de Atenção Integral à Saúde da Criança* [Policy of Comprehensive Care to Child Health], which refers to the delivery of comprehensive healthcare to children with diseases that are prevalent during childhood and with chronic diseases⁽⁴⁾.

Based on the previous discussion, the research question is: what are the officially provided causes of hospitalization among children under the age of five linked to chronic

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diseases from 2010 to 2015? The objective was to identify rates of hospitalizations caused by chronic diseases among children under the age of five, from 2010 to 2015, both in the state of Rio Grande do Sul, Brazil and at a national level.

METHOD

This ecological study using a time series trend is intended to identify hospitalizations caused by chronic diseases in the state of Rio Grande do Sul and in Brazil as a whole, from 2010 to 2015.

Data collection included consulting the Health Information Systems by accessing the official databases of the Brazilian Public Health System, the Department of Informatics (DATASUS) linked to the Ministry of Health. Information concerning the causes of hospitalizations among children aged zero to five years old were obtained from the Hospital Information System (SIH-SUS) and the Brazilian Institute of Geography and Statistics (IBGE).

Secondary data concerning children aged zero to five years old, their diagnoses and frequency of hospitalization, were used in this study. Data were obtained by selecting the item Unit of Federation. The ICD 10 was selected in the row; age group 01 was selected in the column; content was hospitalization; period was monthly; and age groups were 0 to 1 year old and from 1 to 4 years old. These were the steps to collect data both from the state of Rio Grande do Sul and from Brazil. Data were organized in Excel spreadsheets (Version 2010), and later analyzed through descriptive analysis using EpiInfo (Version 3.5.2).

Inclusion criteria were categories of chronic diseases. Exclusion criteria were diseases that represented less than 1% of hospitalizations and hospitalizations with other causes, due to the large variety of diagnoses these could include, such as traumatic injuries and acute diseases.

The description of the most prevalent diseases was established by the ratio of the total number of hospitalizations caused by chronic diseases (or separated by disease) of children living in the state of Rio Grande do Sul aged

between zero and five years old, and the total population of this same age group per year, estimated by IBGE in each year, multiplying this quotient by 100,000 inhabitants.

The gross ratios of the calculated indicators were later assessed using the empirical Bayesian method⁽⁵⁾. It was necessary to remedy potential random rate swings, something common in population studies. The empirical Bayesian method assumes that rate θ_i is a random variable with a mean μ_i and a variance σ_i^2 . Thus, a combination between the observed rate, the mean (μ_i) and indicator's confidence weight (w_i), according to the equation:

$$\theta_i = w_i t_i + (1 - w_i) \mu_i$$

Factor w_i is given by

$$w_i = \frac{\sigma_i^2}{\sigma_i^2 + u_i/n_i}$$

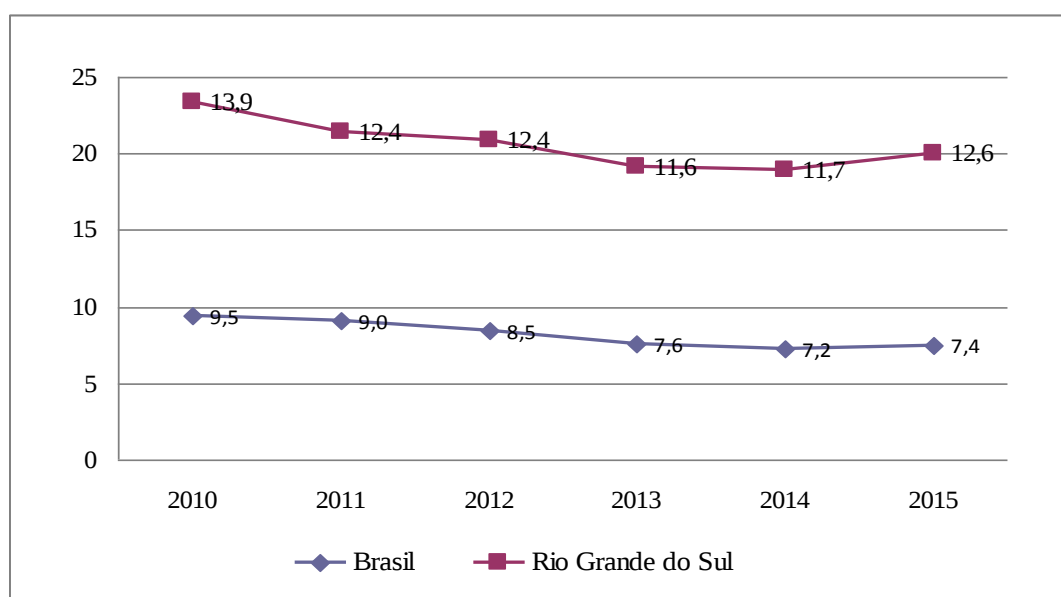
The results are analyzed and presented with absolute and relative frequency, as there was no possibility to perform analysis using mean or trend.

The researchers complied with ethical guidelines in accordance with Resolution 466 from December 12th, 2012. Authorization provided by the Institutional Review Board was not necessary because this study used data from the public domain with unrestricted access.

RESULTS

The description of the relative frequency (%) of hospitalizations caused by chronic diseases in the period between 2010 and 2015 is described in Graph 1, stratified according to the state of Rio Grande do Sul and Brazil.

Graph 1 shows that the rates of hospitalizations caused by chronic diseases remained stable in the five years under study, both in the state of Rio Grande do Sul and in Brazil. Table 1 presents the prevalence and absolute frequency of hospitalizations caused by chronic diseases in Brazil.



Graph 1. Relative frequency (%) of hospitalizations caused by chronic diseases among children under the age of five in Brazil and in Rio Grande do Sul. 2010-2015. Santa Maria, RS, Brazil. 2016.

Table 1. Absolute frequency and prevalence of hospitalizations caused by chronic diseases among children from 2010 to 2015 at the national level. Santa Maria, RS, Brazil. 2016.

Brazil n(P)	2010	2011	2012	2013	2014	2015
Population ¹ of children in the period	13,796,159	13,920,793	14,044,593	15,147,055	14,938,042	14,737,749
Asthma	72,103(0.52)	64,660(0.46)	56,959(0.41)	52,483(0.35)	44,695(0.3)	45,609(0.31)
Epilepsy	11,973(0.09)	12,052(0.09)	11,718(0.08)	11,769(0.08)	11,957(0.08)	12,370(0.08)
Chronic diseases of amygdalae and adenoids	12,962(0.09)	14,492(0.1)	14,502(0.1)	13,674(0.09)	13,794(0.09)	12,710(0.09)
Bronchitis and other obstructive chronic diseases	9,950(0.07)	10,310(0.07)	11,429(0.08)	11,806(0.08)	11,333(0.08)	11,645(0.08)
Malformation of the circulatory system	8,360(0.06)	8,794(0.06)	8,463(0.06)	8,807(0.06)	8,834(0.06)	9,467(0.06)
Leukemia	3,844(0.03)	4,333(0.03)	4,456(0.03)	4,906(0.03)	5,347(0.04)	5,695(0.04)
Cleft lip and cleft palate labial	3,664(0.03)	4,176(0.03)	4,135(0.03)	4,540(0.03)	4,553(0.03)	4,493(0.03)
Congenital abnormalities of the feet	3,043(0.02)	2,870(0.02)	2,968(0.02)	3,059(0.02)	3,058(0.02)	3,085(0.02)
Heart failure	2,434(0.02)	2,226(0.02)	2,173(0.02)	2,269(0.01)	2,126(0.01)	1,989(0.01)
Kidney failure	1,000(0.01)	958(0.01)	878(0.01)	942(0.01)	1,036(0.01)	1,100(0.01)
Cerebral palsy and other syndromes	700(0.01)	688(>0.01)	744(0.01)	716(>0.01)	764(0.01)	870(0.01)
HIV Human Immunodeficiency Virus Disease	485(>0.01)	393(>0.01)	332(>0.01)	423(>0.01)	363(>0.01)	271(>0.01)

¹Population projected by IBGE; n: number of hospitalizations; P: Prevalence /100,000.

In comparison to the remaining diagnoses, complications caused by asthma were the most prevalent cause of hospitalizations at the national level. Note that respiratory diseases were the most prevalent diseases, though the

prevalence slightly declines over the five-year period. This trend is also true when data from the state of Rio Grande do Sul are analyzed as, shown in Table 2.

Table 2. Absolute frequency and prevalence of hospitalizations caused by chronic diseases among children from Rio Grande do Sul in the 2010-2015 period. Santa Maria, RS, Brazil. 2016.

Rio Grande do Sul n(P)*	2010	2011	2012	2013	2014	2015
Population ¹ of children in the period	643,962	646,539	648,913	699,245	689,101	679,752
Asthma	4,925(0.76)	4,070(0.63)	3,924(0.6)	3,588(0.51)	3,512(0.51)	4,084(0.6)
Epilepsy	1,274(0.2)	1,256(0.19)	1,165(0.18)	1,271(0.18)	1,266(0.18)	1,291(0.19)
Bronchitis and other obstructive chronic diseases	714(0.11)	692(0.11)	946(0.15)	1063(0.15)	1058(0.15)	931(0.14)
Chronic diseases of amygdalae and adenoids	631(0.1)	689(0.11)	773(0.12)	828(0.12)	853(0.12)	787(0.12)
Malformation of the circulatory system	614(0.1)	567(0.09)	480(0.07)	507(0.07)	560(0.08)	642(0.09)
Leukemia	250(0.04)	245(0.04)	265(0.04)	259(0.04)	263(0.04)	281(0.04)
Lip cleft and cleft palate labial	187(0.03)	173(0.03)	231(0.04)	296(0.04)	248(0.04)	244(0.04)
Congenital abnormalities of the feet	144(0.02)	124(0.02)	129(0.02)	102(0.01)	165(0.02)	166(0.02)
Heart failure	132(0.02)	107(0.02)	89(0.01)	65(0.01)	58(0.01)	59(0.01)
Kidney failure	61(0.01)	49(0.01)	36(0.01)	47(0.01)	40(0.01)	41(0.01)
Cerebral palsy and other syndromes	20(<0.01)	12(<0.01)	21(<0.01)	32(<0.01)	33(<0.01)	34(0.01)
HIV Human Immunodeficiency Virus Disease	21(<0.01)	19(<0.01)	16(<0.01)	28(<0.01)	13(<0.01)	5(<0.01)

¹Population projected by IBGE; n: number of hospitalizations; P: Prevalence /100,000.

Diseases of the respiratory tract that affected children in Rio Grande do Sul followed the same trend as the national scenario. Epilepsy, which was the second most frequent reason for hospitalizations (after asthma), also followed the national trend. Asthma, as a reason for hospitalization, showed a decline in the period under study. Among respiratory diseases, only in 2010 did asthma account for more than half of the hospitalizations caused by chronic diseases. Bronchitis, and other obstructive chronic diseases, on the other hand, presented an increase from 2010 to 2014.

Note that the rate of hospitalizations caused by congenital malformation remained stable over the last six years. Among neurological disorders, epilepsy presented an increase in the rates of hospitalization in the period under study. Neoplasias, however, increased from 2010 to 2015, while the rates of hospitalizations caused by HIV remained stable.

The tables show that asthma was the most prevalent cause of hospitalization in the last six years among children under the age of five, both in the state of Rio Grande do Sul and at the national level. The prevalence of asthma in 2010 was 5.22% in Brazil as a whole, while in Rio

Grande do Sul, the prevalence of asthma was 7.64% in the same year.

DISCUSSION

The results do not indicate random fluctuations in the prevalence rates in the period under study; a confidence interval of 95% was considered. Thus, the calculated raw rates are reliable for measuring prevalence based on the data collected. Nonetheless, ecological studies analyzing historical trends present limitations, such as the fact that aggregate analysis does not control for confounding factors, in addition to problems arising from the quality of the sources of information, for example, under-reporting and classification errors. Some measures were adopted in this study to minimize these limitations, such as having someone not involved in the study to checking data.

There is an expressive drop in the number of reports in 2014. We believe this is due to inconsistencies in the reporting of data. The survival of children who had life-threatening conditions has increased in recent years, which may be associated with the stability of the

prevalence of hospitalizations caused by chronic diseases. This is partly explained by the establishment of public policies and technological development. Nonetheless, newborns who survive after long periods of hospitalization in neonatal units are at a greater risk of experiencing morbidities and impairment due to their health condition at birth and intensive treatment. Many of these children have been diagnosed with a chronic disease and live with chronic health conditions⁽⁶⁾.

The repercussions of chronic conditions include the need for hospitalizations. International studies report that duration of hospitalization is seven times longer among children with chronic diseases than among children without chronic diseases. Children with complex chronic diseases present a hospitalization rate of 331 per 100,000 inhabitants, which is much higher than among healthy children.⁽⁷⁻⁹⁾

Diseases of the respiratory tract were the most prevalent in the state of Rio Grande do Sul and in Brazil. At the national level, asthma, as a cause of hospitalization, presented a decline in the period under study. One study intending to analyze the time trend of asthma among children and adolescents over a ten-year period (1998 to 2008) reports an increase in the diagnosis of asthma in both sexes of the pediatric population from 1998 to 2008 in the different Brazilian regions⁽¹⁰⁾.

A decline was found in this study in the rates of hospitalizations caused by asthma, thus we can infer that the rate of hospitalizations can decrease if there is an early diagnosis and the correct treatment is implemented. The *Programa Infantil de Prevenção de Asma (PIPA)* [Children's Asthma Prevention Program] has existed since 2012 in the city of Uruguaiana, RS, Brazil. Programs such as this can enable better follow-up of the disease from the beginning of symptoms, decreasing the search for urgent services and hospitalizations, especially among patients with undiagnosed, under-treated or poorly controlled asthma, thus avoiding the appearance of pulmonary changes that may lead to the development of Chronic Obstructive Pulmonary Disease (COPD) in adulthood⁽¹¹⁾.

In regard to other respiratory disorders reported in this study, bronchitis and other chronic obstructive diseases presented an increase from 2010 to 2014. The work of health workers in identifying the signs and symptoms of chronic obstructive diseases and establishing a diagnosis early during childhood⁽¹²⁾ is essential to the treatment of these diseases, as it is essential to assessing treatment adherence. These actions in combination can decrease the aggravation of diseases and improve the quality of life of this population.

The rates of hospitalizations caused by congenital malformation remained stable over the last six years. A study conducted in Chilean hospitals reports that the rates of congenital malformations did not change for a period of 18 years. Hospitalizations caused by neoplasias increased from 2010 to 2015⁽¹³⁾. In addition to representing morbidity indicators, neoplasias during childhood present a growing proportion of child mortality worldwide, indicating that cancer care will demand additional policies addressing the structural aspects of care delivery, in addition to a need to establish a system to record the prevalence of cancer during childhood⁽¹⁴⁾.

Among neurological disorders, epilepsy presented increased rates of hospitalization in the period under study. Childhood epilepsies are a heterogeneous group of diseases with a wide variety of causes and equally varied forms of presentation. To establish a precise diagnosis of epilepsy, however, remains a challenge⁽¹⁶⁾.

There were increased rates of epilepsy in this study's period. One study, the objective of which was to describe the profile of morbidity among children with chronic health conditions, reports that 26.9% of the children presented Spastic Cerebral Palsy and 14.2% had Neuropsychomotor Developmental delay, while the remaining presented other morbidities; 72.4% of the children presented some type of neonatal complication, showing that perinatal diseases were the main causes of morbidities among the population under study⁽¹⁷⁾.

The low rates and absolute frequency of hospitalizations caused by complications accruing from HIV infection remained stable over the this study's period and may be related to the policies intended to prevent vertical

transmission of HIV by using antiretroviral therapy during pregnancy; keeping the duration of rupture of the membrane under four hours and the mother's viral load low, in addition to ensuring improved antiretroviral coverage⁽¹⁸⁾.

Despite decreased vertical transmission, however, public policies need to be strengthened to adapt actions intended to control vertical transmission of HIV⁽¹⁹⁾. Primary care should be improved, with early recruitment of pregnant women for prenatal care and expanding the use of rapid diagnostic tests. Additionally, workers providing care to pregnant and parturient women need to be better trained. All these combined have a positive impact on children's health.

Therefore, a new perspective is required, especially on the part of the coordinators of the healthcare network, when we consider the implications of a chronic disease on the health of children and how the aggravation of such diseases affects the health of children and the need for hospitalizations. Care delivery should take into account a more extensive list of chronic needs and a discussion concerning what "being a child with a chronic disease" means should be encouraged so that social support and healthcare services are provided to children undergoing a process of chronic illness⁽²⁰⁾.

FINAL CONSIDERATIONS

In recent years, qualifying or identifying chronic conditions during childhood has resulted

in a slight decrease in the rate of hospitalizations caused by chronic diseases in public services, both in the state of Rio Grande do Sul and in Brazil. Diseases affecting the respiratory tract and epilepsy remain the most frequent reasons for hospitalizations caused by chronic diseases during childhood, while asthma is the major cause of hospitalization.

Even though the main causes of hospitalization in general tend to stabilize, health services need to be aware of the demands a chronic disease imposes on the lives of children and their families so that healthcare is structured in order to provide proper care to all levels within the health network.

Perhaps the decreased, or more stabilized, number of hospitalizations is not related to a decreased or stabilized number of chronic diseases affecting the child population. For this reason, there is a need for epidemiological studies addressing the situation of children's health, especially in terms of chronic diseases, to support the practice of health workers at all levels of the health network.

Reflecting on the hospitalizations of children caused by the exacerbation of chronic diseases can support the establishment of public policies and the organization of healthcare services and health promotion, improving the quality of life of children with chronic diseases and that of their families.

HOSPITALIZAÇÕES POR DOENÇAS CRÔNICAS EM CRIANÇAS MENORES DE CINCO ANOS NO SISTEMA PÚBLICO DE SAÚDE NO BRASIL E NO RIO GRANDE DO SUL

RESUMO

Objective: to identify rates of hospitalizations from chronic diseases among children under the age of five from 2010 to 2015. **Method:** Ecological study using a time series trend. Data were collected from the Hospital Information System of the Brazilian Public Health System between January and March 2016. After data were digitalized, descriptive analysis was performed using EpiInfo. **Results:** The frequency of hospitalizations caused by chronic diseases among children younger than 5 years old remained between 10.8% and 11.2% in Brazil and 13.8% to 16.1% in Rio Grande do Sul. Respiratory disorders were the most prevalent, both in the state of Rio Grande do Sul and at the national level. Asthma was the most prevalent reason for hospitalization. **Final considerations:** Even though, in general, the causes of hospitalizations tend to remain stable, emphasis is placed on the high prevalence of chronic conditions in childhood and their impact on the lives of children and their families.

Palavras-chave: Doença crônica. Criança. Saúde da criança. Hospitalização.

HOSPITALIZACIONES POR ENFERMEDADES CRÓNICAS EN NIÑOS MENORES DE CINCO AÑOS EN EL SISTEMA PÚBLICO DE SALUD EN BRASIL Y EN RIO GRANDE DO SUL

RESUMEN

Objetivo: Identificar las tasas de hospitalización por enfermedades crónicas en niños menores de cinco años de 2010 a 2015. **Método:** Estudio ecológico de tendencia de series temporales. Los datos fueron extraídos del Sistema de Informaciones Hospitalarias del Sistema Único de Salud y recolectados entre enero y marzo de 2016. Tras la digitalización de los datos, fue realizado análisis descriptivo utilizando el programa EpiInfo. **Resultados:** La frecuencia de hospitalizaciones por enfermedades crónicas en niños menores de cinco años se mantiene constante entre 10,8% a 11,2% en Brasil y 13,8% a 16,1% en Rio Grande do Sul. Se identificó que los trastornos respiratorios fueron los más comunes en los dos escenarios, dando destaque a Asma (como motivo de internación más prevalente). **Consideraciones finales:** Las causas de internaciones a pesar de presentar, de modo general, una tendencia a estabilidad, se enfoca la alta prevalencia de la agudización de las condiciones crónicas en la infancia y la repercusión de ellas para la vida del niño y de su familia.

Palabras clave: Enfermedad crónica. Niño. Salud del niño. Hospitalización.

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