

# CHILD HOSPITALIZATION DUE TO PRIMARY CARE SENSITIVE CONDITIONS

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**ABSTRACT:** The objective in this research was to characterize hospitalizations of children under five years of age due to primary care sensitive conditions in Cuiabá, Mato Grosso, between 2007 and 2011. Descriptive study of hospitalization records obtained from the Hospital Information System of the Unified Health System, analyzed per sex, age range, causes and year. In total, 16,156 hospitalizations were registered. Of these, 6,258 (38.7%) were due to primary care sensitive conditions, with a larger number of children between one and four years of age (3,697). The main causes were bacterial pneumonias, pulmonary diseases, infectious gastroenteritis and complications. The hospitalization coefficients remained stable in the study period, with a slight reduction in 2010 and 2011. Despite a reduction in the hospitalization coefficient due to primary care sensitive conditions, the results may indicate deficiency in the quality of care in the city studied.

**DESCRIPTORS:** Hospitalization; Child health; Primary health care; Health care quality indicators; Descriptive epidemiology.

## HOSPITALIZAÇÃO DE CRIANÇAS POR CONDIÇÕES SENSÍVEIS À ATENÇÃO PRIMÁRIA

**RESUMO:** Esta pesquisa teve como objetivo caracterizar as hospitalizações de crianças menores de cinco anos por condições sensíveis à atenção primária, em Cuiabá, Mato Grosso, entre 2007 e 2011. Estudo descritivo dos registros das hospitalizações obtidas do Sistema de Informações Hospitalares do Sistema Único de Saúde, analisadas por sexo, faixa etária, causas e ano. Registraram-se 16.156 hospitalizações. Dessas, 6.258 (38,7%) foram por condições sensíveis à atenção primária, com maior número em crianças de um a quatro anos (3.697). As principais causas foram pneumonias bacterianas, doenças pulmonares, gastroenterites infecciosas e complicações. Os coeficientes de hospitalizações permaneceram estáveis no período estudado, com discreta redução nos anos de 2010 e 2011. Embora tenha ocorrido redução do coeficiente de hospitalizações por condições sensíveis à atenção primária, os resultados podem indicar deficiência na qualidade da atenção no município estudado.

**DESCRIPTORIOS:** Hospitalização; Saúde da criança; Atenção primária à saúde; Indicadores de qualidade em assistência à saúde; Epidemiologia descritiva.

## HOSPITALIZACIÓN DE NIÑOS POR CONDICIONES SENSIBLES A LA ATENCIÓN PRIMARIA

**RESUMEN:** Esta investigación tuvo como objetivo caracterizar las hospitalizaciones de niños menores de cinco años por condiciones sensibles a la atención primaria, en Cuiabá, Mato Grosso, entre 2007 y 2011. Estudio descriptivo de los registros de las hospitalizaciones obtenidas del Sistema de Informaciones Hospitalares del Sistema Único de Salud, analizadas por sexo, franja etaria, causas y año. Fueron registradas 16.156 hospitalizaciones. De esas, 6.258 (38,7%) fueron por condiciones sensibles a la atención primaria, con mayor número en niños de un a cuatro años (3.697). La principales causas fueron neumonías bacterianas, enfermedades pulmonares, gastroenteritis infecciosas y complicaciones. Los coeficientes de hospitalización permanecieron estables en el período estudiado, con discreta reducción en los años de 2010 y 2011. A pesar de haber ocurrido reducción del coeficiente de hospitalizaciones por condiciones sensibles a la atención primaria, los resultados pueden apuntar a una deficiencia en la calidad de la atención en el municipio estudiado.

**DESCRIPTORIOS:** Hospitalización; Salud del niño; Atención primaria a la salud; Indicadores de calidad en asistencia a la salud; Epidemiología descriptiva.

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## INTRODUCTION

The Primary Care Sensitive Conditions (PCSC) are a set of health problems, including: perinatal conditions, bacterial pneumonias, among other infectious diseases in which effective action in the Primary Health Care (PHC) context culminates in the reduction of hospitalizations due to these problems<sup>(1)</sup>.

The World Health Organization (WHO) estimates that more than 10 million children in developing countries die before completing the age of five years. Approximately 70% of these deaths are caused by evitable diseases like acute respiratory infections, diarrheic diseases, infections, nutritional deficiencies and immunopreventable diseases<sup>(2)</sup>. Deaths by these causes are considered avoidable because they are related to a combination of biological, social, cultural factors and organizational aspects of the health care model<sup>(1,3)</sup>.

In view of the high hospitalization rates due to PCSC and the need for indicators to assess the quality of care and problem-solving ability of health services, in 2008, the Ministry of Health created the Brazilian List of Hospitalizations due to Primary Care Sensitive Conditions, which covers the diseases that can be prevented through immunization, as well as sensitive conditions like: infectious gastroenteritis and complications, anemia, nutritional deficiencies, ear, nose and throat infections, bacterial pneumonias, asthma, lower airway diseases, kidney and urinary tract infection, skin and subcutaneous tissue infection<sup>(4-5)</sup>.

A study on the causes of hospitalizations in children between zero and four years of age in Brazil between 1998 and 2007, in the Unified Health System (SUS), indicated variations in the proportions of hospitalizations due to infectious and parasitic diseases: North (31.7%), Northeast (28.7%), Southeast (15.1%) and South (15.5%). When observing the hospitalizations due to respiratory diseases, similar proportions were found in the South (44.2%), Central-West (42.7%) and North (37.7%)<sup>(6)</sup>. Among other aspects, these variations appoint the epidemiological profile and climatic influence as a greater chance of illness<sup>(7)</sup>.

Research on the characteristics of child hospitalizations due to PCSC can provide useful scientific evidence to assess the indicators of care quality and problem-solving ability of health

services<sup>(6-9)</sup>, considering that high-quality primary care can reduce or even avoid hospitalizations due to these causes<sup>(10)</sup>. In addition, high hospitalization rates due to PCSC can indicate a less guaranteed access to the health system or its performance<sup>(1)</sup>.

The objective in this study is to characterize the hospitalizations of children under five years of age due to PCSC in the city of Cuiabá-Mato Grosso (MT) between 2007 and 2011.

## METHODS

A descriptive study was undertaken of hospitalizations due to PCSC involving children under five years of age living in Cuiabá, state of Mato Grosso, which happened between 2007 and 2011 and were registered in the Hospital Information System of the Unified Health System (SIH/SUS), available on the website of the Informatics Department of the Unified Health System (DATASUS).

Cuiabá, the state capital of Mato Grosso, is located in the Central-West of Brazil. According to the 2010 census, the population of children under five years of age corresponded to 40.553, representing 7.4% of the total population<sup>(11)</sup>. In 2012, the hospital care network for this population consisted of 12 hospitals, six of which were private, two public and four non-for-profit beneficial, totaling 166 beds, 107 of which were affiliated with the Unified Health System, while 59 were private<sup>(12)</sup>. The primary care network included 65 family health teams. The mean coverage rate of the family health strategy during the study period was 30.35% of the population<sup>(13)</sup>.

The hospitalizations were classified as PCSC or non PCSC, in line with Ministry of Health Decree 221/2008<sup>(4)</sup>. In this study, hospitalizations with informed causes were included, while those registered as "other causes" were excluded, as they add a range of undistinguished problems.

The variables studied were sex, age range (younger than one year and between one and four years), basic cause of hospitalizations, categorized according to the International Classification of Diseases – Tenth Revision (ICD-10) and the year of occurrence. The annual proportions of hospitalizations due to PCSC were calculated per sex and age range. Therefore, the numerator was the number of hospitalizations due to PCSC according to the different categories of variables studied, and the denominator was

the total number of hospitalizations according to the same categories. The proportions were presented in percentages. In addition, the annual hospitalization coefficient due to PCSC (per 1000 inhabitants) was calculated per age range and group of causes, using the number of hospitalizations due to these causes as the numerator and the population of Cuiabá per corresponding age range as the denominator. The population estimates and data from the 2010 Census were used, calculated by the Brazilian Institute of Geography and Statistics (IBGE), available on the of DATASUS website.

To process the information, the tabulation software - Tabwin and DBASE were used. The data were analyzed according to absolute and relative frequencies and the tables and graphs were constructed in Microsoft Office Excel® version 2007. No ethical approval was sought as this research is based on secondary data in the public domain, without identification of the subjects.

## RESULTS

During the study period (2007 till 2011), 16,156 hospitalizations of children under five years of age were registered. In the total group of hospitalizations, 6,258 (38,7%) were due to PCSCP and 9,898 (61,3%) to non PCSP. As regards the proportion of hospitalizations due to PCSP in relation to the total number of hospitalizations, variation was observed among the years under analysis, ranging between the maximum of 42,4% in 2009 and the minimum of 35,1% in 2007. As

regards the sex, hospitalizations of male children in the two age ranges studied were predominant: 55,1% in the age range under one year and 53,2% among children between one and four years of age (Tables 1 and 2).

An increase was observed in the hospitalization rate due to PCSC among children under year of age, from 64,2% to 68,6% between 2007 and 2008, as well as a drop in the coefficients between 2009 and 2011 (68,2% and 47,5%). The hospitalization coefficients among children between one and four years of age indicated a slight drop in the indicator between 2007 and 2011, corresponding to 23% and 18,7%, respectively. The hospitalization rate of children in this age range was lower than that in children under one year of age across the study period (Table 3).

In Table 4, a significant increase is observed in the hospitalization rate due to bacterial pneumonias in 2008 and 2009 in children under one year of age (from 23,57% to 38,7%) and in children between one and four years old (from 6,68% to 13,07%). In 2008, 2009, 2010 and 2011, a slight variation was observed in the hospitalization rates due to pulmonary diseases in children under one year of age (7,62%, 7,91%, 6,99%, 7,96%, respectively).

Across the study period, the pulmonary diseases and asthma showed the lowest hospitalization rate among children between one and four years. The highest rate was found for pulmonary diseases (0,87%) in 2008 and for asthma (1,55%) in 2007.

Table 1 – Hospitalizations of children under five years of age according to primary care sensitive conditions (PCSC) or not and year of occurrence (N= 16156). Cuiabá-MT, 2007-2011

PCSC	2007		2008		2009		2010		2011		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Yes	1434	35,1	1314	40,4	1344	42,4	1167	38,9	999	37,6	6258	38,7
No	2646	64,9	1935	59,6	1827	57,6	1832	61,1	1658	62,4	9898	61,3
Total	4080	100	3249	100	3171	100	2999	100	2657	100	16156	100

Source: Hospital Information System of the Unified Health System, 2013.

Table 2 – Hospitalizations of children under five years of age due to primary care sensitive conditions, according to sex and age range (N=6258). Cuiabá-MT, 2007-2011

Characteristics of hospitalizations	2007		2008		2009		2010		2011		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
<b>&lt; 1 year</b>												
Male	316	55,1	311	53,2	316	55,6	257	57,3	211	55,0	1.411	55,1
Female	258	44,9	274	46,8	253	44,4	192	42,7	173	45,0	1.150	44,9
Total	574	100	585	100	569	100	449	100	384	100	2561	100
<b>1 to 4 years</b>												
Male	417	48,5	403	55,3	428	55,2	383	53,3	333	54,1	1.964	53,2
Female	379	44,1	326	44,7	347	44,8	335	46,7	282	45,9	1.669	45,1
Not registered	64	7,4	-	-	-	-	-	-	-	-	64	1,7
Total	860	100	729	100	775	100	718	100	615	100	3697	100

Source: Hospital Information System of the Unified Health System, 2013.

Table 3 – Hospitalization rates (per 1000 inhabitants) due to primary care sensitive conditions, according to age range and year. Cuiabá-MT, 2007 - 2011

Age range	2007	2008	2009	2010	2011	Total
< 1 year	64,2	68,6	68,2	56,1	47,5	60,9
1 to 4 years	23	20,4	22,1	22,1	18,7	21,3
Total	31,0	29,7	30,3	28,8	24,4	28,8

Source: Hospital Information System of the Unified Health System, 2013.

Table 4 – Hospitalization Rate due to primary care sensitive conditions in children under one year of age, according to the group of causes. Cuiabá-MT, 2007 - 2011

Group of PCSC causes	2007		2008		2009		2010		2011		Total	
	n	Coef*	n	Coef	n	Coef	n	Coef	n	Coef	n	Coef
Bacterial pneumonias												
< 1 year	307	34,36	201	23,57	320	38,7	241	30,09	195	22,49	1264	29,75
1 to 4 years	479	12,81	239	6,68	458	13,07	330	10,14	305	9,45	1811	10,47
Pulmonary diseases												
< 1 year	42	4,70	65	7,62	66	7,91	56	6,99	69	7,96	298	7,01
1 to 4 years	7	0,19	31	0,87	9	0,26	7	0,22	15	0,46	69	0,40
Infectious gastroenteritis and complications												
< 1 year	41	4,59	70	8,21	62	7,43	70	8,74	29	3,34	272	6,40
1 to 4 years	89	2,38	114	3,19	114	3,25	173	5,32	99	3,07	589	3,40
Skin and subcutaneous tissue infections												
< 1 year	49	5,48	90	10,55	13	1,56	22	2,75	26	3,00	200	4,71
1 to 4 years	28	0,75	148	4,14	56	1,60	91	2,80	93	2,88	416	2,40
Kidney and urinary tract infections												
< 1 year	38	4,25	54	6,33	31	3,72	13	1,62	12	1,38	148	3,48
1 to 4 years	41	1,10	59	1,65	44	1,26	19	0,58	19	0,59	182	1,05
Ear, nose and throat infections												
< 1 year	37	4,14	43	5,04	28	3,36	6	0,75	12	1,38	126	2,97
1 to 4 years	114	3,05	74	2,05	45	1,28	35	1,08	34	1,05	302	1,75
Asthma												
< 1 year	17	1,90	9	1,06	8	0,96	7	0,87	5	0,58	46	1,08
1 to 4 years	58	1,55	21	0,59	15	0,43	23	0,71	17	0,53	134	0,77
Other diseases**												
< 1 year	43	4,81	53	6,21	41	4,92	34	4,25	36	4,15	206	4,85
1 to 4 years	44	1,18	43	1,20	34	0,97	40	1,23	33	1,02	194	1,12
Total												
< 1 year	574	64,23	585	68,59	569	68,23	449	56,07	384	44,29	2.561	60,28
1 to 4 years	860	23,01	729	20,37	775	22,11	718	22,06	615	19,06	3697	21,37

Source: Hospital Information System of the Unified Health System, 2013.

\*Coefficient; \*\*cerebrovascular diseases, hypertension, diabetes mellitus, gastrointestinal ulcer and anemia, epilepsies, nutritional deficiencies, perinatal conditions, diseases preventable by immunization and sensitive conditions, cardiac failure.

## DISCUSSION

Most hospitalizations due to PCSC involved male children between one and four years of age. The main causes were bacterial pneumonias, pulmonary diseases, infectious gastroenteritis and complications.

The findings in Cuiabá demonstrated that the proportions of hospitalizations due to PCSC is lower than that due to non PCSC, with a considerable difference, as observed in a study conducted in Montes Claros, state of Minas Gerais, between 2007 and 2008<sup>(14)</sup>.

This study evidenced a drop in hospitalizations

due to PCSC in Cuiabá in 2010 and 2011. This kind of research permits the indirect measuring of the access, functioning and problem-solving ability of primary care services<sup>(8)</sup> as, in Brazil, studies appoint a close relation between primary care coverage and these indicators<sup>(15-17)</sup>. A study that analyzed hospitalizations due to PCSC in children under five in 417 cities in the state of Bahia evidenced that the prevalence of hospitalization due to gastroenteritis in this age range was 43% higher in cities with a family health strategy (FHS) coverage rate below 70%. In addition, the study demonstrated that, in cities where the coverage rate of the FHS increased during the study period, the hospitalization rates due to this

cause dropped<sup>(18)</sup>. This ratifies the importance of the actions developed in primary care to reduce the hospitalizations in children younger than five.

In Cuiabá, the proportion of hospitalizations due to PCSC was larger among male children in both age ranges and across the study period, similar to the findings in Montes Claros<sup>(14)</sup>. The greater proportion of this cause among male children is understandable as they were more numerous in the population of children under five years of age in the city during the most recent census. Also, the distribution pattern between the sexes that was found in this study coincides with the description in a research that analyzed the hospitalization causes in the SUS among children between zero and four years of age in Brazil<sup>(6)</sup>.

The analysis of the PCSC hospitalization coefficients in Cuiabá shows a drop in the age range under one year old. This drop was also observed in other states, like in the research that described the hospitalizations due to PCSC in the State of Espírito Santo between 2005 and 2009, using the Brazilian List of Primary Care Sensitive Conditions – PCSC<sup>(19)</sup>. This condition may be related to the expanded coverage of the FHS in the city during the years analyzed, which increased from 19.9% to 38.8%, which may mean an increased coverage of prenatal care and child monitoring services, two extremely important actions to bring down childhood hospitalizations.

The results found in Cuiabá appoint bacterial pneumonias, pulmonary diseases and gastroenteritis and complications as the main causes of hospitalizations in children under four years of age. Studies developed in other Brazilian cities also evidenced these as the main conditions responsible for childhood hospitalizations<sup>(6,17,20)</sup>. It should be highlighted that, while the other studies indicated perinatal problems as the third cause of hospitalization, these were responsible for less than five hospitalizations per 1,000 children during the study period and were classified under other diseases in this study.

Bacterial pneumonias were the main causes of hospitalization due to PCSC in this study in the two age ranges. A research undertaken in the State of Piauí appointed respiratory diseases as the main cause of hospitalization in children under one year of age, including pneumonias. Among children between one and four years old, in turn, infectious and parasitic diseases

were predominant, which include infectious gastroenteritis and its complications<sup>(17)</sup>. Despite the expanded coverage of the FHS in Cuiabá in the study period (coverage superior to 70%), this indicator remains below the desired level, which may indicate that actions specifically focused on reducing the prevalent childhood diseases are not reaching most children under five years old, which can entail high hospitalization rates due to respiratory diseases like pneumonias.

A study undertaken in Bahia showed that hospitalizations due to respiratory causes, like those appointed in this study, may be associated with the coverage of primary care services, as the hospitalization rates in children under five years of age were higher in cities with an FHS coverage inferior to 70%<sup>(18)</sup>. In the case of the city studied, the climatic characteristics of the region should be highlighted, with long periods of drought and low relative air humidity, as well as a large number of burns<sup>(7)</sup>. A study undertaken in Tangará da Serra, State of Mato Grosso is in accordance with this reflection, with 90% of respiratory problems due to pneumonias, the majority in children under five years old and in dry periods<sup>(21)</sup>.

Among the respiratory diseases, bacterial pneumonia was responsible for most hospitalizations in the city studied. In the State of Mato Grosso, between 2007 and 2010, 253 deaths were registered in children under five years of age due to pneumonias, which represented 6.7% of all deaths (3,796). In Cuiabá, pneumonias were responsible for 5.1% of deaths in this age range between 2007 and 2010<sup>(22)</sup>.

In a broader context, infectious gastroenteritis and its complications play a relevant role in childhood hospitalizations in the city under study and in Brazil. A study undertaken in the State of Pernambuco appointed that 25% of hospitalizations in children under five years of age were due to diarrheic diseases<sup>(23)</sup>.

Although the results from Cuiabá are less expressive than those from the study cited, the number of hospitalization due to diarrheic diseases and their complications are a source of concern, as most of them could be avoided through timely and high-quality primary care actions. A literature review evidenced that most studies on PCSC hospitalizations indicates the protective association of primary care coverage variables. Hence, preventive consultations,

vaccinations and timely childcare are associated with a lower risk of PCSC hospitalizations<sup>(1)</sup>. Considering that vaccination is an important protective means against diseases, health professionals, especially nurses, carry great responsibility regarding childhood vaccination and can intervene efficiently in the health/disease process, focusing their actions on the promotion of vaccination and health education of the child's parents/responsible caregivers<sup>(24)</sup>.

The results presented in this study signal the urgent need to invest in strategies that privilege the prevention of prevalent childhood diseases and health promotion. Studies evidence that actions like the encouragement of exclusive breastfeeding and appropriate orientations to parents and caregivers about child care significantly reduce the hospitalization rates due to respiratory problems and diarrheic diseases<sup>(25-26)</sup>. In this context, the Integrated Management of Childhood Illness (IMCI) strategy is highlighted, a method developed by the World Health Organization (WHO) and the Pan American Health Organization (PAHO) that is aimed at monitoring and intervening in the most common problems associated with deaths in children under five years of age in developing countries<sup>(2)</sup>.

A study has shown that investments in the set-up, implementation and monitoring of the IMCI strategy can improve the quality of life and reduce the childhood morbidity and mortality, as all countries that adopted it as a child care method obtained significant improvements in the quality of care and reduced their childhood hospitalizations due to PCSC<sup>(27)</sup>. In addition, the strategy strengthens the decentralization process of the actions, promotes the increased coverage of the control measures for the diseases that cause childhood hospitalizations and improves the referral systems, enhancing the problem-solving ability at the primary care level<sup>(28)</sup>.

It is important to highlight that this study comes with methodological limitations related to the data source used, considering that the observation units are the hospitalizations, as the same child may have been hospitalized more than once. In addition, the SIH/SUS information is restricted to cases in the SUS, excluding the population attended by health insurances and private services<sup>(20)</sup>. Another limitation is the five-year study period, which is considered a short

interval to permit trend analyses. Nevertheless, the period analyzed expresses the dimensions of the event hospitalizations due to PCSC.

## FINAL CONSIDERATIONS

In conclusion, PCSC-related hospitalizations may indicate deficiencies in the quality of primary health care, despite the reduction in the proportion of these causes in Cuiabá in the most recent years investigated.

These research results trigger reflections on the health promotion and disease prevention practices. It should be reminded that hospitalizations in general demand great spending from health systems and, when they happen among young people and children under five, they tend to be more costly. Therefore, investment in primary care actions are needed to reduce cases of hospitalizations and, consequently, to increase the quality of care for this vulnerable population.

Considering that the Brazilian literature has emphasized the close relation between primary care coverage and the magnitude of the indicator hospitalizations due to PCSC, health policies in the city should particularly focus on the expansion of the FHS and the qualitative strengthening of primary health care actions.

In addition, to reduce the hospitalization rates due to the problems described in the Brazilian list of PCSC, it is fundamental to guarantee the access of children under five years of age to primary health care services and the reception of comprehensive and problem-solving care, mainly for conditions that can be prevented and/or treated at that care level without the need for hospitalizations due to these causes.

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