

Causes of hospitalization in the National Healthcare System of children aged zero to four in Brazil

Abstract

Introduction: Examining the causes of hospitalization of children improves the comprehension of the sickness profile and in the elaboration of health care planning requirements to prevent the worsening of disease, avoiding intaken hospitalization. Aim: Identifying on the official databases the truly causes of hospitalization amongst children aged zero to four as a matter of having a better understanding of which illnesses have been responsible for their intaken hospitalization in Brazil. Method: Quantitative, descriptive, exploratory and inferring approaching research, whose databases had been, collected together the National Health System Data (DATASUS), in the period between the years of 1998 to 2007. The databases have been transcript to tables, quantitatively organized, analyzed in a descriptive and inferring statistic way. Results have been indicating heterogeneous morbidity distribution within the regions of the country, prevailing as the number one cause of intaken hospitalization of children aged from zero to four, the ailments of the respiratory system followed after by human parasites infectious diseases. Conclusion: The considered databases allow a reflection on how health services can organize themselves in order to implement fully health attention to the outlined group-age of zero-to-four-child, focusing on the primary care, prioritizing the prevention of respiratory acute distresses and human parasite infectious diseases, once these two groups are considered featuring-part of illnesses whose account are given due to ambulatory care sensitive causes and, may be restrained and/or minimized by the action-taking in the prime care.

Key-words: morbidity, hospitalized child, health profile, epidemiology.

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Introduction

The Brazilian Public Health System (SUS) is characterized by the hierarchy; in which primary health care corresponds to the basic procedures that promoting of the health status for a given population, and the higher levels of health care are compounds by the ambulatory and hospital care of medium and high complexity¹. The primary health care, relates to a set of diagnoses that could prevent intaken Hospitalization by appropriate health care. In other words, primary care sensitive conditions are health problems attended by the actions of the first level of care². These hospitalization causes, should be avoided through timely and effective primary care. The focus of this study is to analyze the children hospitalizations, in order to identify them by sensitive conditions to ambulatory care, from the primary health care model as widespread in the country.

Studying the hospitalization causes among children aged zero to four in Brazil, help us to understand the sickness profile in this age group and drawing up plans for health care to prevent the disease worsening so that hospitalizations are avoided. The idea is that the solvability of the primary health care should be reflected in the intaken Hospitalization decrease by a group of specific causes. The intaken hospital for primary care causes are an indirect indicator of health system effectiveness, in that instance, assuming that hospitalizations resulting from these diseases that did not receive timely and effective health care, leading to a worsening of clinical condition that required the hospitalization³. The indicator was created in the United States, during the 1990s, under the name of *Ambulatory Care sensible*; to assess the impact of inadequate access to primary care services⁴⁻⁶.

Preventable causes, according to the classification proposed by São Paulo's State System for Data Analysis (SEADE Foundation) are categorized as follows: reducible causes by immuno-prevention, for adequate pregnancy control, for proper birth care,

for prevention actions, early diagnosis and treatment and through partnerships with other sectors⁷.

In this study, we work with a grouping of data causes given by the National Health System Data (DATASUS), which can be classified as reducible by prevention actions, early diagnosis and treatment, diseases for which treatments exist, even if they are highly complex procedures and whose failure in any of these steps can lead to intaken hospitalization. They are: infectious and parasitic diseases, endocrine glands and metabolism diseases, nervous system and sense organs diseases, circulatory, respiratory, perinatal diseases and external causes⁸.

The number of intaken hospitalizations is conceptualized as the average number of hospitalizations paid by the Public Health System (SUS) into groups with related causes, considering the population of residents in a certain geographical area and a specific period of time⁹.

This indicator allows analyzing population, geographical and temporal variations in proportion distributions of intaken hospitalizations for different causes, identifying unequal situations and trends that require action and specific studies. The indicator can also contribute to conduct comparative analysis of hospital medical resources concentration, as well as, subsidize planning processes, management and evaluation of public policies directed to hospital medical assistance⁹.

There are some limitations, which we are now going to highlight, for the indicator adequate understanding, such as: the service offer reflects the availability of human, material, technological and financial resources, as well as, technical and administrative criteria that SUS adopted for payment; the intakes in hospitals unities not affiliated with SUS are not considered, which may focus attention on certain specialty care, influencing the SUS standard of care; the possibility that the proportional increase in hospitalizations for a specific cause group, can be result of its reduction in other groups; the indicator is influenced

by the hospitalizations cumulative count of the same patient, same cause and analyzed period; the information system used, may not detect inconsistencies in the classification cause of morbidity reported⁹.

Using children hospitalization, only when a particular disease cannot be treated at the primary health care, should be the health teams' purpose in various departments according to numerous studies¹⁰⁻¹⁵ already made pointing out the consequences of children hospitalization.

Thus, this article aims to identify, in Brazil, the causes of hospitalization of children aged zero to four years old, during the years of 1998 to 2007, through official DATASUS data.

Method

Quantitative research approach, descriptive, exploratory and inferential whose data were collected from the DATASUS website, through a form previously elaborated.

The Data were obtained directly from the Ministry of Health website (www2.datasus.gov.br/DATASUS/index.php?area=02), choosing the item relating to health information, health indicators, basic data - 2008 and then indicators of morbidity and risk factors. The hospitalizations proportion (SUS) by causes groups, was the indicator chosen to obtain data, by region, for all cases groups, annually, during the period of ten years being the last available year 2007, comprising the study period from 1998 to 2007.

The Data were divided by age into two specific groupings, children under 1 year old and children from 1 to 4 years old, since the age of children under five years old, which we set out to analyze, has its data is in the DATASUS system dispose this way, separated into two age groups. However, we performed the grouping of the two age groups for data analysis.

The data were transcribed into tables, organized quantitatively and analyzed using descriptive statistics by constructing average tables, standard deviation and of

inferential statistics, t-student test to compare average of two independent samples, variance analysis to compare more than two samples and Pearson's correlation, considering in all 5% significance.

The group causes are presented in accordance with the classification given by the Hospital Information System of SUS (SIH), DATASUS¹⁶, as follows: infectious and parasitic diseases, neoplasias, mental and behavioral disorders, respiratory, digestive and genitourinary diseases, pregnancy, birth and puerperium, external causes and some others. Despite contrary opinions about this grouping, it was adopted inasmuch as it is the way the Ministry of Health provides data for health statistics analysis and knowledge in Brazil.

The tables were constructed with reference to the diseases grouping established in the site data provision, excluding those groupings for which the mentioned indexes were less or equal to 1%, neoplasias/cancer (1%) mental and behavioral disorders (0%), circulatory diseases (0.4%), pregnancy, childbirth and puerperium (0%). Was also excluded from the analysis, the other causes group with an average incidence percentage of 25.8% during the period, since it comprises a large variety of diagnoses, with small involvement percentages, which together represent this group of causes.

The data presented in this study are secondary and are part of the doctoral research project entitled "*Case-resolving capacity of health care services for children under five years with complaints of preventable diseases*", approved by the Ethics Committee in Research UNIOESTE, under the opinion #245/2009-CEP.

Results

In Table 1 the average number of SUS hospitalizations was taken, comparing the Brazil regions, according to the grouping of diseases that most affect children of age group from one to four years old, for ten years (1998-2007). The diseases are: respiratory diseases (40.3%), as the leading cause

Tabela 1 - Comparison of the hospitalizations (SUS) average proportion between the Brazilian regions, children 0-4 years by groups of diseases in the period 1998 to 2007 - Brazil, 2009.

Group of diseases	Regions					<i>p-value</i>
	North	Nordeste	South East	South	Central-West	
infecto-parasitic	31.7±1.7a	28.7±1.6b	15.1±1.1cd	15.5±1.2de	20.1±2.4f	<0.0001
respiratory	37.7±2.7a	38.4±1.9a	40.2±1.3ac	44.2±3.7bc	42.7±1.4c	<0.0001
digestive	5.8 ±0.5a	4.4±0.4ab	5.8±0.5a	6.6±1.3a	6.7 ±2.2ac	0,001
external causes	2.2±0.2a	1.8±0.1b	3.4±0.1c	2.8±0.2d	2.4±0.1a	0.00*
genitourinary	2.1 ±0.1a	1.8±0.2a	2.8±0.4b	2.1±0.2a	2.1±0.3a	<0.0001

Source: Department of Health/SE/Datasus(National Health System) – Hospitals Information System of The National Health System (SUS) – SIH/ SUS 2009

Note: The letters correspond to the result of the Tukey test, which means that different letters indicate a statistically significant difference to the 5% level of significance.

of hospitalizations, infectious and parasitic diseases (21.6%) as the second leading cause of intaken hospitalization, digestive diseases (5.5%) ranks as the third cause, external causes (2.5%) as fourth in the events that lead to children hospitalization and genitourinary diseases (2.2%), being the fifth and final grouping of diseases. This comparison was performed by variance analysis through Tukey's range test with 5% significance level. In all diseases groupings were obtained statistically significant difference.

For infectious and parasitic diseases the intake hospitalizations average in Northern and Northeast Region are higher than in the other regions. The lowest average obtained was from the Southeast Region.

For respiratory diseases, the average hospitalization in Northern and Northeast Region are lower than in the others, with the highest average in the Southern Region, followed by the Central-west and the lowest average was for the Northern Region.

Considering the digestive diseases, was found significant difference between the Northern regions, with the lowest average and Central-West Region, with the highest average.

Comparing the external causes by region it appears that only the Northern and Central-West ones can be considered statistically identical, therefore all others show differences, with a greater proportion in the Southeast Region.

Comparing the average number of hospitalizations related to genitourinary system disease, was found that only the Southeast Region showed significant differences, with an higher average than the others.

Still analyzing Table 1, now considered by regions, was found that the respiratory disease groups has most involvement as hospitalization cause, followed by the infectious and parasitic disease groups, to all regions.

Comparing the average hospitalizations by gender in table 2, during the same period,

Tabela 2 - Comparison of the intaken hospitalization average proportion with the NATIONAL HEALTH SYSTEM (SUS) amongst 0-to-4-year-old-children gender and group of disease, from 1998 through 2007, Brazil, 2009.

Group of diseases	Male	Female	<i>p-value</i>
Infecto-parasitic	21,1±1,2	22,2±1,3	0,06
Respiratory	40,5±1,3	40,0±1,4	0,41
Digestive	6,3±0,7	4,6±0,7	0,00*
Genitourinary	2,5±0,3	2,0±0,3	0,00*
External causes	2,7±0,2	2,3±0,1	0,00*

*Significant at the level of 5%

statistically significant differences ($p < 0.05$) were found for both the digestive and genitourinary disease groups, of which both were higher in males.

Analyzing the hospitalizations study group in relation to other age groups (5-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69 and 70 years or up), in table 3, statistically significant difference were noted for all disease groups, in which the hospitalizations average, during the study period, were higher for children up to 4 years in the respiratory, infectious and parasitic disease groups and external causes and lower for the digestive and genitourinary tract disease groups.

Through the ratio of hospitalizations in the infecto-parasitic disease group between children ages 0 to 4 years old and other age groups, we found that for every 3 children who were hospitalized, one adult is hospitalized for the same group of causes. For the respiratory diseases group the ratio obtained was 2.9, similar to the previous

group. Unlike the prevalent diseases of the digestive and genitourinary group wherein the ratio obtained was reverse, respectively 0.6 and 0.3, indicating that for each child over four years old, who are intake in the hospital, 0.6 0.3 Children from 0 to 4 years are hospitalized.

Observing Table 4, there is a significant correlation between the proportion of poor people and infectious disease groups and external causes. However, the correlation between the proportion of poor people and infecto-parasitic diseases is positive, which indicates that the higher the average number of hospitalizations, for this cause, the greater the proportion of poor people, whereas the correlation between the proportion of poor people and external causes is reversed, in other words, the higher the average intaken hospitalizations number, the lower is the proportion of poor people.

There is also a significant correlation between the Gross National Product (GNP)

Tabela 3 - Comparison of the hospitalization average proportion with the NATIONAL HEALTH SYSTEM (SUS) amongst 0-to-4-year-old-children and other, for groups of disease, in the period of 1998 through 2007, Brazil, 2009.

Group of Disease	4 years old or younger	Older than 4	<i>p</i> -value
Infecto-parasitic	21,6±1,2	7,3±0,7	0,00*
Respiratory	40,3±1,3	13,9±1,4	0,00*
Digestive	5,5±0,7	9,7±0,3	0,00*
Genitourinary	2,4±0,2	9,7±0,3	0,00*
External Causes	2,6±0,1	8,0±2,1	0,00*

*Significant to the level of 5%

Tabela 4 - Correlation amongst Gross National Product apiece and the proportion of poverty, for groups of disease, according economic and social indicators for regions, at the period of the study, Brazil, 2009.

Variables	Poverty proportion		GNP per capita	
	Correl. coefficient	<i>p</i> -value	Correl. coefficient	<i>p</i> -value
Infecto-parasitic	0,94	0,02*	-0,93	0,02*
Respiratory	-0,51	0,38	0,28	0,64
Digestive	-0,41	0,49	0,24	0,70
Genitourinary	-0,77	0,13	0,90	0,04*
External causes	-0,82	0,09	-0,88	0,04*

*Significant at the level of 5%

per capita (PPP) the genitourinary system and infecto-parasitic disease groups and external causes. However, the correlation between GNP per capita and infectious diseases is negative, which indicates that the higher the average numbers of those hospitalizations, the lower the GNP per capita.

The correlation between GNP per capita, genitourinary tract diseases and external causes is positive, in other words, the higher the average numbers of hospitalizations for these two reasons, higher the GNP per capita.

Discussion

It is relevant to note that the information analysis generated through secondary data, must be viewed with caution, mainly the data produced from various levels of the health system, whose limitations, from the origin to the processing, should be taken into consideration. We know that there were improvements much of in the quality of the information generated, as in the geographic coverage expansion. Meanwhile, the under-reporting problem persists. Nevertheless, we chose the official data systems to work with, because of its easiness of access and the availability to everyone, anytime, for who wants to contribute to the discussion presented in this study.

Another aspect to consider as methodology limitation, concerns the conceptualization of avoidable diseases, since there is variability in the literature list of diseases with different views on the thematic, reflecting the difficulty of consensus. In these studies, various indicators are adopted by diverse local realities.

The morbidity pattern, the health care demand behavior, the lifestyle, socioeconomic conditions, the access of outpatient resources and the constitution of care networks in each region of the country, also affect the results. Within ten years, a temporal analysis, was not presented, however a trend towards proportions stability, in the period, was noted, with small oscillations during the studied period, regarding the

proportion of occurrence, however without inversion of the morbidity causes which remained throughout this time.

Therewith regarding morbidity, the results indicate the respiratory diseases as the first cause of hospitalization in children aged from zero to four years old, followed by infecto-parasitic diseases, in the country as a whole. However, was noticed a predominance of the latter causes group, in the North and Northeast region and a minor proportion in the Southeast region, considered more developed. Unlike, for respiratory diseases, notes predominated in the South and Central-West Region and minor proportion in the Northern region, suffering climatic influence and regional disparities, regarding access to health services and health professionals, as living conditions.

The digestive diseases group affected more the Central-West Region and had less impact on Northeast region. For genitourinary system diseases, the Southeast region exceed, as well as external causes.

Gender does not influence the causes groups involvement, unless in the gastrointestinal and genitourinary diseases, where the boys were prevalent, unlike the research on infant mortality from preventable causes, which indicate a male overjet for all causes groups.

In correlation with all SUS hospital intaken, children are hospitalized the most due respiratory, infecto-parasitic diseases and external causes compared to other age groups and less from gastrointestinal and genitourinary diseases, what highlighting children organic fragility, which requires specific actions to prevent injuries like these.

Study performed in the southern region of Santa Catarina, to analyze hospital intakes of ambulatory care¹⁷ sensitive conditions, from 1994 to 2004, showed that there was a decline in pneumonia hospitalization rates among children under five years old in the population with adequate basic ambulatory care, while the diarrhea rates tended to stability unlike our results that showed the respiratory diseases as leading

hospitalization cause, and among them the pneumonia.

Was conducted, in 1994, a study¹⁸ about hospitalizations for preventable causes in children aged one to four years old in the Northeast region, found a hospitalization rate of 24.4%, mostly pneumonia (7.3%). According the research authors, the majority of hospitalizations occurred from preventable causes or sensitive to ambulatory care.

In studies¹⁹⁻²⁰ conducted in Spain, to validate the causes of hospital intakes sensitive to primary care and measure the primary health effectiveness, the results pointed to the association rates of hospitalizations for these diseases with the characteristics of the primary care organization, municipality size and referral hospitals distance. It was found that 8.42% of those admissions were categorized as sensitive to primary care, these 15% were pneumonia and 6.4% urinary tract infections, for the ordinary population.

Another study²¹ held in a renowned hospital institute in the Northeast region of Brazil, focused on avoidable infant mortality, showed that proportional mortality, according to underlying causes, was found as the third cause, 16.8%, and intestinal infectious diseases, with mortality coefficient of 26 per thousand hospitalizations.

In research²² on infant mortality and avoidability in Mato Grosso do Sul, Brazil, was found a predominance in males, for causes groups such as: infecto-parasitic diseases (9.4%), respiratory diseases (8.7%), predominantly for children under one year old. Analyzing the child mortality causes by avoidability parameter, was found that deaths avoidable through appropriate actions of early diagnosis and treatment corresponded to 10.4%, and through actions to promote health, linked to appropriate actions care were responsible for 11.2%, with a predominance of deaths from pneumonia and intestinal infectious diseases and nutritional deficiencies, About the external causes, with proportional involvement average around 2% in our study, research²³ conducted in Paraná, evaluating morbidity and mortality from external causes in chil-

dren under fifteen years old, showed that morbidity was 4.1% higher than we previously found, with falls and car accidents as mainly responsible for hospitalizations.

Evaluating primary health care and hospitalizations for sensitive conditions to ambulatory care in Minas Gerais municipalities, the authors¹ found major male vulnerability to potentially preventable hospitalizations and greater probability of these hospitalizations causes in children under five years old, reflecting the child fragility and suggesting priority groups for the primary health care actions.

The analysis of the causes of morbidity in children shows that diarrheal and respiratory diseases remain serious problems and, when accompanied by malnutrition, endanger their lives²⁴. Respiratory diseases, also, are the first cause of outpatient consultations in emergency rooms and outpatient clinics, demanding qualified attention from the health staff, with continuity until the problems complete resolved. Intestinal parasites follow with significant prevalence and along with diarrheal diseases interfere with the children proper development²⁵.

The study²⁶ on the relationship between causes of avoidable death with adequate health care and the SUS implementation, showed that for grouping of preventable causes by early diagnosis and treatment, the major risk in the first period of study indicate that the health system reorganization, prioritizing primary care, may have passed on the incidence, and acting on its reduction, reason why studying these indicators can be important to redirect health actions.

The results of this study show that we continue to be influenced by the unequal hospitalizations for preventable causes distribution, sensitive to socioeconomic conditions, investment in public health and the provision of services, since those regions with GNP per capita and low income level showed higher hospitalization rates for avoidable causes than in those with better conditions, like the findings of the study²⁷ on infant mortality from preventable causes in Brazil.

The DATASUS data are available and easily accessible. Thus, we believe that the continuous review of morbidity rates for preventable conditions can be a useful tool to monitor a common group of diseases behavior, detecting (surrogate marker) quality conditions of the primary care network, can also provide information for the health priorities choice.

It is essential that actions in this regard continue to be performed so that it is possible to reduce childhood morbidity from preventable causes in the country. Thus, some challenges must be the guiding public heal-

th efforts. One it is to decrease children under 5 years hospitalization from preventable causes in all regions of the country through actions that ensure the accessibility of primary health care, resolving assistance of the unique needs of each child. Public policies should be consistent with each situation, both as regards the resources distribution and in adopting strategies to improve the health of this population. Understanding the importance of primary prevention and promotion activities for children less than 5 years old can minimize problems now faced resulting of infant morbidity.

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