

HOSPITALIZATIONS FOR PRIMARY CARE-SENSITIVE CONDITIONS: ECOLOGICAL STUDY

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ABSTRACT: This study aimed to analyze hospitalizations for primary care-sensitive conditions in a municipality in the State of Piauí. Ecological study, using records from the Hospital Information System, from 2008 to 2015. Trend analysis was performed using a general polynomial regression model and a gender-stratified diagnostic group. A decrease in the overall rate of these hospitalizations in the municipality was identified ($r^2 = 0.9783$; $p < 0.001$). Diabetes ($p = 0.005$), cystitis ($p = 0.047$) and congenital syphilis ($p = 0.015$) presented increasing rates. With variations according to gender, increasing for women: cystitis ($p = 0.018$), diabetes ($p = 0.024$), congenital syphilis ($p = 0.021$), hypertension ($p = 0.018$); and decreasing for women: gastric and duodenal ulcer ($p = 0.033$), asthma ($p = 0.006$) and heart failure ($p = 0.002$). In men, there were increasing: bronchitis and acute bronchiolitis ($p = 0.039$), diabetes ($p = 0.003$) and decreasing: hypertension ($p = 0.025$) and asthma ($p = 0.010$). It was concluded that the hospitalizations were variable regarding diagnosis and gender, not being linear for the causes.

KEY WORDS: Basic health services; Ecological studies; Health care quality, access, and evaluation; Primary health care.

INTERNAÇÕES HOSPITALARES POR CONDIÇÕES SENSÍVEIS À ATENÇÃO PRIMÁRIA: ESTUDO ECOLÓGICO

RESUMO: Objetivou-se analisar internações por condições sensíveis à atenção primária em um município do Piauí. Estudo ecológico de séries temporais, utilizando registros do Sistema de Informação Hospitalar, no período de 2008 a 2015, com dados para o Estado do Piauí, Brasil. A análise de tendência foi realizada com o modelo de regressão polinomial geral e por grupo de diagnóstico estratificado por sexo. Identificou-se decréscimo na taxa geral dessas internações no município ($r^2 = 0,9783$; $p < 0,001$). Apresentaram-se taxas crescentes: *diabetes* ($p = 0,005$), cistite ($p = 0,047$) e sífilis congênita ($p = 0,015$). Variaram segundo o sexo, sendo crescente para o feminino: cistite ($p = 0,018$), *diabetes* ($p = 0,024$), sífilis congênita ($p = 0,021$), hipertensão ($p = 0,018$); e decrescentes: úlcera gástrica e duodenal ($p = 0,033$), asma ($p = 0,006$) e insuficiência cardíaca ($p = 0,002$). No masculino, foram crescentes: bronquite e bronquiolite aguda ($p = 0,039$), *diabetes* ($p = 0,003$) e decrescentes: hipertensão ($p = 0,025$) e asma ($p = 0,010$). Conclui-se que as internações foram variáveis quanto ao diagnóstico e sexo, não sendo linear para as causas.

PALAVRAS-CHAVE: Atenção primária à saúde; Estudos ecológicos; Qualidade, acesso e avaliação da assistência à saúde; Serviços básicos de saúde.

INTRODUCTION

The construction of the Brazilian Unified Health System (SUS) represents, throughout history, an important chapter in the conception of health as a right. In this context, Primary Health Care (PHC) stands out, considered the structural axis of SUS. The Family Health Strategy (FHS) was adopted to guide and standardize PHC actions, defining reference teams, areas of operation and attributes of the work process.¹

Systems organized based on PHC, especially those with good coverage (above 70%) by the FHS model, show lower rates of hospitalization for some causes and considerable decrease in health costs.²⁻⁴ At this level of care, important indicators were developed to verify, indirectly, the effectiveness and resolvability of the care provided, such as Hospitalizations for Primary Care-Sensitive Conditions (HPCSC).

In 2008, through Ordinance GM/MS 221, dated April 17, the Ministry of Health (MH) published the Brazilian list of Primary Care-Sensitive Conditions (PCSC) and defined it as an instrument to assess PHC.^{5,6} Sensitive conditions are health problems whose morbidity and mortality profile can be reduced or altered by resolute and efficient primary care.^{5,7} From this list, it is possible to estimate the rates of Hospitalizations for Primary Care-Sensitive Conditions (HPCSC) and evaluate the performance of health services, in addition to verifying the effectiveness of public policies. HPCSC rates are also used to assess PHC resolution, quality and accessibility.^{3,8}

These actions, such as disease prevention, diagnosis and early treatment of acute diseases, control and monitoring of chronic diseases, should result in the reduction of hospital admissions for these problems.^{9,10}

This indicator contributes to and makes it possible to assess the ability to solve problems that can be addressed in PHC, since there are preventive and timely measures, in addition to outpatient treatments, that is, they are preventable causes by the precise, resolute and efficient performance of the primary care teams.¹¹

In this sense, it provides managers with an expanded and strategic view on the quality of primary care, enabling identification and knowledge of the actions developed by the health service, as well as imply

knowing indirectly the effectiveness of primary care in the municipality. Many of these are known to most health managers, such as: a) difficulty in associating health needs with community demands; b) lack of coordination between levels of assistance; c) insufficiency and poor management of financial resources; d) precarious employment relationships, generating high turnover of health professionals, especially medical doctors.^{12,13}

Thus, when considering the importance of PHC for SUS, this study aimed to analyze the HPCSC in the municipality of Picos, State of Piauí, in a historical series from 2008 to 2015.

METHODOLOGY

This was an ecological study, using time series of hospitalizations of residents of the municipality of Picos, State of Piauí, Brazil, for primary care-sensitive conditions, registered in the Hospital Information System (HIS), from 2008 to 2015.

The municipality of Picos is located in the center-south region of the State of Piauí, in Northeastern Brazil, with a population estimate of 76,928 inhabitants, in a territorial area of 577,304 km².¹⁴ It is also an important commercial center of the state, crossed by highways BR 316, 407 and 230.

In the health sector, Picos is managed by the Municipal Health Secretariat. In Primary Care, activities are carried out by 36 Basic Health Units (BHU), one FHS for each BHU. Of these, 25 are located in urban areas and 11 in rural areas. Health care is complemented by a medium-sized hospital that meets emergency demands of low and medium complexity, maintained by the municipality with state incentive. In its macro-region, Picos has about 42 municipalities, which also use health services, through the referral and counter-referral system.¹⁵

The population was made up of all hospitalization records that occurred in that municipality, in which the main diagnosis registered in the HIS/SUS Hospitalization System was a primary care-sensitive condition, according to the 10th Revision of the International Classification of Diseases (ICD-10), in the years 2008 and 2015.

The causes for hospitalization and diagnoses analyzed are described in Ordinance GM/MS 221, of

April 17, 2008, and present in the 10th International Classification of Diseases and Related Health Problems (ICD-10): diseases preventable by immunization and sensitive conditions (A33-A37, A95, B16, B05-B06, B26, G00.0, A17.0, A19, A15-A16, A18, A17.1-A17.9, I00-I02, A51-A53, B50-B54 and B77); infectious gastroenteritis and complications (E86 and A00-A09); anemia (D50); nutritional deficiencies (E40-E46 and E50-E64); ear, nose and throat infections (H66, J00-J03, J06 and J31); bacterial pneumonias (J13-J14, J15.3-J15.4, J15.8-J15.9 and J18.1); asthma (J45-J46); lower airway diseases (J20, J21, J40-J44 and J47); hypertension (I10-I11); angina (I20); heart failure (I50 and J81); cerebrovascular diseases (I63-I67, I69 and G45-G46); diabetes mellitus (E10-E14); epilepsies (G40-G41); kidney and urinary tract infection (N10-N12, N30, N34 and N39.0); infection of the skin and subcutaneous tissue (A46, L01-L04 and L08); inflammatory disease of the female pelvic organs (N70-N73 and N75-N76); gastrointestinal ulcer (K25-K28, K92.0, K92.1 and K92.2); diseases related to prenatal care and childbirth (O23, A50 and P35.0); congenital syphilis (A50); and congenital rubella syndrome (P35.0), reported in both sexes.⁵

Thus, the sample was composed of the entire population, since it is an ecological study, in which the records are available in full, the analysis of total data gave greater robustness to the inferences.

Data were collected from January to February 2018, using secondary data from hospitalizations originating from Hospitalization Authorizations (AIH), contained in the HIS information bank, available online, on the Department of Informatics website of SUS (DataSUS), between 2008 and 2015, considering that at the time of access, only these years were available. This system provides information pertaining to all hospitalizations carried out in Brazil in recent years, also providing knowledge and/or a survey of the profile of hospital morbidity, mortality and costs of hospitalizations.

The search for data to be inserted in the research was guided by the following flow:

Access to the DATASUS platform, using the electronic address: <http://datasus.saude.gov.br/>; In the “access to information” tab, the following commands were chosen: “health information (TABNET)”, “epidemiological and morbidities”; “SUS hospital morbidity (SIH/SUS)”,

“general, by place of hospitalization since 2008”, Piauí; “Jan/2008 to Dec/2015”, “Picos”, and ICD-10 list “disease”.

Data were obtained using the Brazilian List of Primary Care-Sensitive Conditions as an instrument for data collection. From the information previously exposed, data were tabulated in a Microsoft Excel spreadsheet and, after that, the rates were calculated using the gross value of hospitalizations as the numerator and the population of the chosen period as the denominator. Data were normalized to 10,000 inhabitants, because the city population is less than 100,000 residents.

Polynomial regression was used for trend analysis, considering the rate of hospitalizations due to primary care-sensitive conditions as a dependent variable (Y) and the years as an independent variable (X). Dispersion diagrams were constructed between the hospitalization rate and the years, in order to identify the function that expressed the relationship between them and, thus, choose the order of the polynomial for analysis and the polynomial regression model. The trend was considered significant when the estimated model obtained $p < 0.05$. Trend analysis of overall HPCSC and by sex was performed. Pearson Chi-square was applied to check the degree of association between the year and the rate of hospitalizations for primary care-sensitive conditions. The calculations of hospitalization rates containing the time series were prepared in Microsoft Excel spreadsheets, and for trend analysis, IBM Statistics, version 20.0 was used.

RESULTS

The results refer to the HPCSC that occurred in the municipality of Picos, State of Piauí, Brazil, from 2008 to 2015, registered in DATASUS. Figure 1 illustrates the distribution of HPCSC in Picos, showing that in the studied period, there was a general decrease in rates per 10,000 inhabitants (67.38 to 51.99), confirmed by the coefficient of determination ($r^2 = 0.9783$) and linear regression ($p < 0.001$).

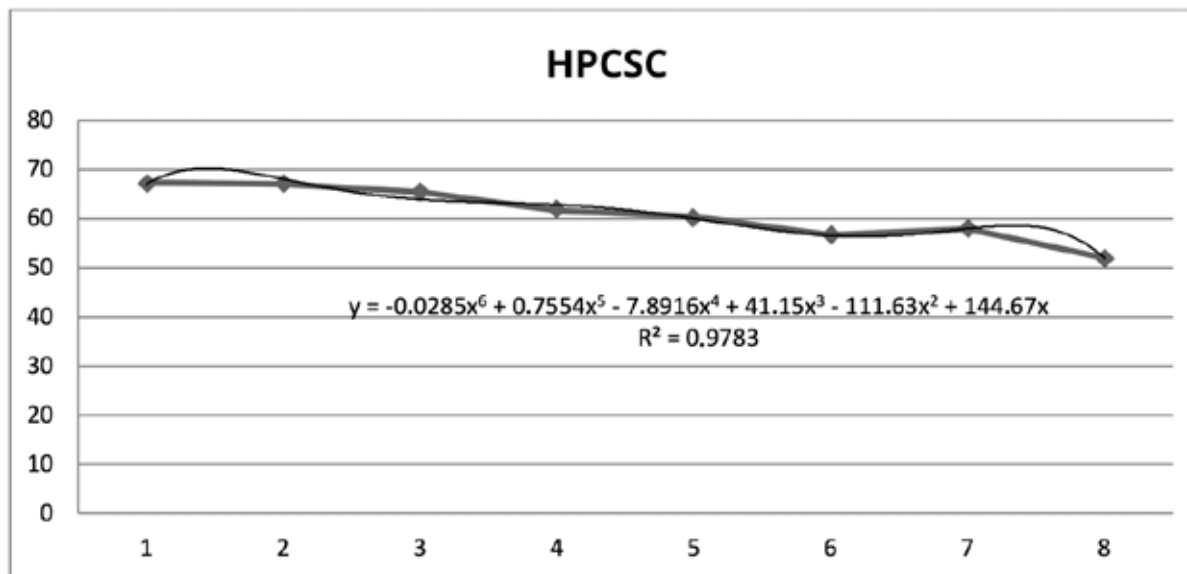


Figure 1. Distribution of the overall rate of hospitalizations for primary care-sensitive conditions. Picos, State of Piauí, Brazil, 2008-2015.

The main causes of HPCSC were the diabetes mellitus ($r_2 = 0.8897$; $p = 0.005$), kidney and urinary tract infections (cystitis) ($r_2 = 0.9117$; $p = 0.047$) and diseases related to prenatal care and childbirth (Congenital Syphilis) ($r_2 = 0.9832$; $p = 0.015$), remaining increasing during the period. Ear, nose and throat infections (otitis media and other middle ear disorders after mastoiditis) ($r_2 = 0.9838$; $p = 0.0048$), asthma ($r_2 = 0.9551$; $p = 0.007$), hypertension (essential hypertension) ($r_2 = 0.9826$; $p = 0.017$), heart failure ($r_2 = 0.9849$; $p = 0.011$) showed a decreasing proportion. The other groups remained

stable during the study period, with a lower frequency of hospitalization.

Table 1 presents the distribution of hospitalization rates, for the male gender. The causes with increasing trends were acute bronchitis and acute bronchiolitis ($r_2 = 0.9678$; $p = 0.039$) and diabetes mellitus ($r_2 = 0.8545$; $p = 0.003$). However, in this period, there was also a reduction in hospitalizations for asthma ($r_2 = 0.9678$; $p = 0.039$) and essential hypertension ($r_2 = 0.9504$; $p = 0.025$). The remaining causes remained stable during the study period.

Table 1. Distribution of hospitalization rates for conditions sensitive to primary care, for males. Picos, State of Piauí, Brazil, 2008-2015 (Continuation)

Disease	2008	2009	2010	2011	2012	2013	2014	2015	r^2 * (p) **
Whooping cough	0	0	0	0	0	0	0.274	0	0.946 (0.310)
Acute Hepatitis B	0	0.566	0	0.276	0.275	1.651	0.274	0.547	0.773 (0.321)
Rheumatic fever	0.284	1.132	0	0.830	0.275	1.651	0.823	0.547	0.50 (0.539)
Malaria	0	0	0	0	0.275	0.275	0.274	0	0.923 (0.200)
Iron-Deficiency Anemia	0.569	0.566	0.281	0.553	0.551	0.825	0.274	0.273	0.810 (0.499)
Otitis media and other middle ear disorders after mastoiditis	1.992	3.113	0.845	2.214	1.655	1.651	1.372	0	0.652 (0.078)

									(Conclusion)
Pharyngitis and acute tonsillitis	0	0.849	0	0	0	0	0	0	0.668 (0.310)
Pneumonia	59.48	66.23	46.49	58.67	39.73	62.47	85.35	76.67	0.834 (0.226)
Asthma	169.6	231.2	176.3	189.8	139.8	141.7	126.2	97.48	0.889 (0.011)
Bronchitis and acute bronchiolitis	3.415	9.906	7.889	9.410	11.31	15.41	11.80	10.95	0.967 (0.039)
Emphysema and other chronic obstructive pulmonary diseases	12.52	20.94	8.735	10.79	3.862	7.705	8.508	8.215	0.710 (0.119)
Essential hypertension	33.87	44.71	48.46	40.13	41.66	30.27	14.54	9.310	0.950 (0.025)
Heart failure	64.89	72.45	60.30	75.83	71.46	57.24	41.99	50.93	0.984 (0.074)
Diabetes Mellitus without complications	17.93	18.11	26.48	22.69	25.93	30.27	26.89	36.14	0.854 (0.003)
Cystitis	25.61	33.11	44.80	32.93	36.41	39.90	39.79	34.50	0.713 (0.294)
Gastric and duodenal ulcer	1.138	1.415	1.408	1.383	2.207	1.651	0.274	0.547	0.970 (0.331)
Congenital syphilis	0	0	0	0	0	212.7	0	322.5	0.975 (0.073)

*r² – coefficient of determination, **p – Pearson's chi-square.

Table 2 lists the rates of HPCSC related to the female sex, the causes in which there was an increase during the study period were diabetes mellitus ($r^2 = 0.8889$; $p = 0.023$), cystitis ($r^2 = 0.9401$; $p = 0.018$), congenital syphilis ($r^2 = 0.9758$; $p = 0.021$) and essential hypertension ($r^2 = 0.9936$; $p = 0.019$). In some causes,

such as heart failure ($r^2 = 0.9625$; $p = 0.002$), asthma ($r^2 = 0.9814$; $p = 0.006$) and gastric and duodenal ulcers ($r^2 = 0.7572$; $p = 0.033$), there was a reduction. The others remained stable, and there were no records for whooping cough and malaria.

Table 2: Distribution of hospitalization rates for conditions sensitive to primary care, for females. Picos, State of Piauí, Brazil, 2008-2015 (Continuation)

Disease	2008	2009	2010	2011	2012	2013	2014	2015	r ² * (p)**
Acute Hepatitis B	0.527	0.261	0.259	0	0.506	0.251	1.003	0	0.764 (0.916)
Rheumatic fever	0.790	0.784	0.519	0	0.759	0.503	1.254	0.499	0.651 (0.844)
Iron-Deficiency Anemia	0.263	0.523	0.259	0.763	1.013	0.251	0.250	0	0.689 (0.529)
Otitis media and other middle ear disorders after mastoiditis	2.898	1.307	4.155	2.291	2.026	1.259	1.254	0	0.686 (0.061)
Pharyngitis and acute tonsillitis	0	0.523	0	0	0	0	0	0	0.668 (0.310)

Disease	2008	2009	2010	2011	2012	2013	2014	2015	(Conclusion)
									r ² * (p) **
Pneumonia	40.31	61.19	33.76	45.07	32.67	57.17	67.24	59.74	0.744 (0.219)
Asthma	178.6	247.1	209.8	186.9	151.4	145.3	126.7	90.48	0.981 (0.006)
Bronchitis and acute bronchiolitis	5.797	8.630	5.973	16.04	17.73	18.63	13.29	10.49	0.904 (0.161)
Emphysema and other chronic obstructive pulmonary diseases	13.96	17.52	8.310	9.930	2.786	6.044	5.018	8.498	0.806 (0.055)
Essential hypertension	41.37	70.35	65.18	59.33	43.31	30.97	10.78	12.74	0.993 (0.019)
Heart failure	63.76	54.39	53.76	55.00	53.69	49.61	38.13	39.49	0.962 (0.002)
Diabetes Mellitus without complications	23.71	32.95	37.39	39.21	36.72	45.33	37.38	42.24	0.888 (0.023)
Cystitis	25.56	45.50	54.53	51.43	51.41	69.76	59.96	59.49	0.940 (0.018)
Salpingitis and oophoritis	2.108	2.615	4.415	3.564	4.306	1.762	3.763	2.749	0.659 (0.835)
Inflammatory cervix disease	0	0	0	0	0	0.251	0	0.249	0.789 (0.095)
Other inflammatory diseases of the female pelvic organs	5.270	4.969	5.973	7.384	6.585	5.037	1.756	4.499	0.974 (0.281)
Gastric and duodenal ulcer	0.527	0.261	0.519	0.254	0.506	0.251	0	0	0.757 (0.033)
Congenital syphilis	0	81.96	80	50.25	93.89	66.66	183.4	373.8	0.975 (0.021)

*r² – coefficient of determination, **p – Pearson's chi-square.

DISCUSSION

The study analyzed HPCSC in the municipality of Picos and sought to identify the main causes of hospitalizations, as well as to verify the trend in relation to the gender variable. There was a decrease in the rates of HPCSC in the municipality analyzed, in the years 2008 to 2015.

Another study showed similar results, which signaled a drop in HPCSC in different regions of Brazil. When analyzing the age group under five, in the State of Piauí, infectious gastroenteritis and complications, bacterial pneumonia and asthma stood out. Despite verifying the reduction in the studied period (2000-2010), the research highlighted that they can be considered high for the analyzed population and that this frequency showed that, despite the expansion of access, the maintenance of the

rates are still considered high, due to potential barriers to access and limitations to the resolution of primary health care services in the state.¹⁶

In Florianópolis, Brazil, between 2001 and 2011, research showed a decrease in the rates of HPCSC. As an explanation, the authors point out that this behavior may be associated with the fact that municipal management has prioritized the FHS as the guiding axis for health care in Florianópolis, highlighting that the percentage of population coverage of the FHS has always been above 50.0%, the from the year 2005. The main causes of HPCSC in the studied period were pneumonia, cerebrovascular diseases, heart failure, chronic obstructive pulmonary disease and diabetes mellitus, thus constituting a higher frequency of chronic diseases.¹⁷

In the results found in the research in the municipalities of the regional health coordinators of the

State of Rio Grande do Sul, Brazil, from 1995 to 2007, there was a drop in the rates of HPCSC, being, therefore, positive, and may be a consequence of the complexity of the actions employed with the changes generated by the health programs and management models adopted in the state. Other actions that may have contributed to this drop in rates were: decrease in the supply of beds by the Unified Health System or migration of patients to other cities due to diseases and the need for more constant treatment in specialized centers.¹⁸

The effectiveness of preventive and health promotion actions carried out at the PHC level are relevant for the reduction of HPCSC, which can be confirmed in a study in the State of Mato Grosso do Sul, in which the decrease in this indicator pointed to an increase in FHS coverage in the municipality, during the period studied, as the main contribution to this result.¹⁹

In a survey carried out in the State of Minas Gerais, Brazil, from 1999 to 2007, for a population aged zero to 19, there was also an important increase in FHS coverage. However, it did not show a significant correlation with the behavior of infant HPCSC, thus suggesting the interference of other variables with the context of the child hospitalization process and the need for public policies to improve the gateway in the scope of health for children and adolescents, in addition to strengthening primary care.²⁰

In the State of Goiás, Brazil, between 2005 and 2015, HPCSC also had a significant downward trend in most health regions. When considering, also, the hospitalizations for other conditions, it was observed that the biggest decline still occurred in the PCSC. Despite this progressive decrease, the rate remained high for the parameters established by the Ministry of Health, and the reduction trend was not linear for all causes.²¹

Other studies showed contrary results,^{22,23} respectively, in São José do Rio Preto, State of São Paulo, from 2008 to 2010, in regions of the Federal District, considering only the HPCSC registered in the period from 2008 to 2012, which showed growth in HPCSC rates. Thus, it points to the need for greater attention to the management of the primary care network, in order to adapt it to the needs of the population, which must be defined based on the diagnosis of the regional health situation. Attention should also be directed to the best use of the

resources available in this health region and the detection of care gaps, so that investments can be more efficient.

When analyzing the relationship between hospitalizations for primary care-sensitive conditions and the coverage of the Family Health Strategy, a direct relationship is proven, as, during the study period, there was an increase in the coverage of the FHS and a reduction in HPCSC in the State of São Paulo, Brazil.²⁴ And, therefore, it is understood that using these rates of HPCSC as an indicator of quality and/or effectiveness of the primary level of health care constitutes a way to assess the result, effect or impact of the care offered to the population.²⁵

It is noteworthy that the use of the proportion of HPCSC as an indicator of quality of primary care is not free from limitations. The culture of the use of health services by the population, the hospitalization policy, the morbidity and prevalence of the disease, factors related to hospitalization that are far from the scope of primary care and the criteria for considering a "sensitive" disease should be considered. Or not, which can be just as subjective when based on scientific evidence.²⁶

Therefore, it is pointed out that Piauí has a high population coverage in relation to the FHS. From 2008 to 2015, coverage increased from 96.49% to 99.42%. In the municipality of Picos, in the same period, coverage of 100% of the population was found in relation to FHS, which, in a way, may be related to the reduction of general rates of HPCSC.

Nevertheless, even with 100% FHS population coverage, the hospitalization rates for Diabetes Mellitus and Congenital Syphilis of Picos remained increasing, showing the need to develop actions to control these diseases, as these rates indicate a possible failure in the implementation of the HiperDia program and in prenatal care, as they are causes in which prevention and treatment are necessarily carried out in primary care.

Given the above, it is emphasized that the prevention and control of these diseases are directly related to the performance of primary care services. Improvements in PHC, with structural investments and made in essential characteristics, such as ease of access, comprehensive care, effective coordination of care, consideration of the family context and the establishment of links between services and the population, are actions that can highly contribute to reduce the occurrence of HPCSC in the municipality.²²

It also highlights the important role of the nurse, both in the construction and elaboration of national bases and in the care provided in primary care.²⁷ The nurse and the other members of the nursing team perform fundamental functions in reducing hospitalizations for sensitive conditions, because it is in primary care that health promotion, disease prevention and disease control actions that make up the Brazilian HPCSC List are prioritized.

Importantly, because it is based on secondary data, this study was subjected to limitations regarding the records in the databases. Moreover, despite the fact that HIS/SUS is a large database, only hospitalizations within the scope of SUS are registered, which, although the majority, express part of the national reality.

CONCLUSION

This research allowed to know and analyze the rate of HPCSC and the main causes of these hospitalizations in the city of Picos, State of Piauí, Brazil. There was a drop in the rates of HPCSC in the municipality studied, from 2008 to 2015. The diagnoses that showed an increasing trend were: diabetes mellitus, cystitis and congenital syphilis, which varied according to sex.

The results may assist managers in the implementation of actions aimed at greater resolution of primary care, with a consequent reduction in expenses on medium and high complexity procedures and greater effectiveness in the management of health services. In addition, the use of HPCSC as an indicator has great potential to contribute to the discussion of the effectiveness of SUS principles and guidelines, including universality, comprehensiveness and equity.

Municipal and health managers are advised to pay attention to the impact that the costs of HPCSC on the municipality, and investments should be used in primary care, enriching assistance and facilitating the population's access to services and, consequently, improving municipal health indicators.

The monitoring of this indicator becomes a relevant starting point to direct actions in the scope of primary health care, due to the high potential for

measuring and identifying the quality of health services, as well as the critical points that deserve intervention, in search of transformation of the population's morbidity and mortality profile.

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