

Hospitalization due to conditions sensitive to primary care and expansion of the Family Health Program in Brazil: an ecological study

Internações por condições sensíveis à atenção primária e ampliação da Saúde da Família no Brasil: um estudo ecológico

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ABSTRACT: Objective: To evaluate the relationship between hospitalization due to conditions that are sensitive to primary care and the population coverage by the Family Health Strategy (ESF) Units of the Brazilian Federation Units in the last decade. **Methods:** This is an ecological study that investigated preventable hospitalizations and coverage of primary health care in Brazil in the historic series from 1998 to 2006. Statistical analysis was performed using the Pearson correlation test and simple linear regression. **Results:** In the studied period, we found an association between population coverage and reduced ESF admissions for primary care sensitive conditions in Brazil ($\beta = -28.78, p \leq 0.01$), which occurred in 38.4% of the Federation Units. **Conclusion:** There was a positive relationship between the expansion of ESF coverage and a decline in hospitalizations for ACSC in the country. The findings of this study help to evaluate the ESF and primary care in Brazil.

Keywords: Family Health. Hospitalization. Primary Health Care. Health Evaluation. Epidemiology. Ecological Studies.

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RESUMO: *Objetivo:* Avaliar a relação entre as internações por condições sensíveis à atenção primária e a cobertura populacional de Estratégias de Saúde da Família nas Unidades da Federação brasileira na última década. *Métodos:* Este é um estudo ecológico que investigou as hospitalizações evitáveis e a cobertura da atenção básica no Brasil na série histórica de 1998 a 2006. A análise estatística foi realizada utilizando-se o teste de Correlação de Pearson e regressão linear simples. *Resultados:* No período estudado, evidenciou-se associação entre cobertura populacional de ESF e redução das internações por condições sensíveis à atenção primária no Brasil ($\beta = -28,78$; $p \leq 0,01$), que ocorreu em 38,4% das Unidades da Federação. *Conclusão:* Houve relação entre a ampliação da cobertura de ESF e a diminuição nas internações por CSAP no País. Os achados deste estudo auxiliam na avaliação da ESF e da atenção básica no Brasil.

Palavras-chave: Saúde da Família. Hospitalização. Atenção Primária à Saúde. Avaliação em Saúde. Epidemiologia. Estudos Ecológicos.

INTRODUCTION

In the 1980s, with the implementation of the Unified Health System (SUS), important changes happened in the Brazilian health system, which was then characterized by a curative, medical-welfare and hospitalocentric system that mainly cared for the urban population and paid workers, therefore, leaving large population contingents unattended, including people living in rural areas, unemployed people and professionals without an adequate work register¹. The Brazilian Sanitary Reform proposed new ways of producing health by prioritizing primary health care, which resulted in more access for the users, improved health indicators and reduced costs of care².

In 1994, the Family Health Program was established, being currently entitled Family Health Strategy (FHS), which aims at reorganizing care practices focusing on basic health care³. FHS includes health promotion actions, prevention of diseases and early diagnosis, especially of more prevalent pathologies and conditions that can be handled in primary care⁴.

In Brazil, FHS needs to work on evaluation processes, including the field of health work⁵ and the impact caused on morbidity and mortality rates of the population⁶, which enable the organization of their assistance actions and practices^{7,8}.

Studies in several countries contributed with the identification of markers that assist the evaluation of health systems, among which are hospitalizations caused by Ambulatory Care Sensitive Conditions (ACSC). The ACSCs are morbidities that can be dealt with in primary care, thus preventing the aggravation of the clinical condition and unnecessary hospitalizations; besides, they constitute an indicator that measures the quality and the resoluteness of FHS⁹⁻¹².

In Brazil, the hospitalization rate is of 525 per 10 thousand inhabitants, and 27% of them are caused by preventable conditions. Among the conditions that lead to hospitalization for ACSCs, pre-existing and transmissible diseases, heart and respiratory conditions, as well as diseases of the circulatory system and those related to prenatal and labor periods are prevalent¹².

The reduced number of hospitalizations due to ACSC is one of the markers of the effectiveness of FHS^{13,14}, based on the fact that hospitalized people were not adequately cared for in the primary level, thus leading to the aggravation of their clinical condition¹⁰⁻¹².

It is estimated that the implementation of public policies addressed to primary care in all of the Brazilian states in the past few years has contributed with the reduction of hospitalizations. The objective of this study was to assess the relationship between hospitalizations for ACSC and the population coverage of FHS in the Brazilian Federation Units in the past decade.

METHODS

This is an ecological study that analyzed the relationship between hospitalizations for ACSC and the population coverage of FHS in the Brazilian Federation Units in the historic series of 1998 to 2006. The ecological model was considered to be appropriate to assess the results of a health public policy comprehending large population groups¹⁵, so it is difficult to conduct this type of evaluation using only the individual perspective.

Secondary data referring to hospitalizations for ACSC were collected in the Primary Care Information System, in the electronic address of DATASUS (www.datasus.gov.br), from the Ministry of Health. Hospitalizations were selected from the Brazilian list of ACSC¹⁶, elaborated by the Ministry of Health in 2005 (Table 1), which identifies conditions that are sensitive to primary health care¹¹. There are 20 groups of causes including pathologies and conditions belonging to each chapter of the ICD-10.

Coefficients of hospitalization for ACSC were developed, proportionally to 10 thousand inhabitants for Brazil and the Federation Units in the analyzed period. In the numerator, there was the total of hospitalizations due to avoidable causes and, in the denominator, the estimated population for each year of the historic series.

The number of FHS teams in Brazil and in the Federation Units was obtained in the website of the Primary Care Department, from the Ministry of Health (<http://dab.saude.gov.br/>). The ratio of inhabitants per FHS was calculated by dividing the total number of the population by the number of teams in the studied period.

The population coverage of FHS was calculated by estimating 3,500 people for each team. Firstly, the total number of assisted people was obtained, by multiplying the number of FHS teams in each Federation Unit by 3,500. Then, the result was divided by the total population of each State, obtaining the percentage of population coverage for each Brazilian Federation Unit.

The statistical analysis was conducted with the software Statistical Package for the Social Sciences (SPSS), version 11.5. The relationship between FHS coverage and hospitalizations for ACSC was estimated with the Pearson correlation teste, and the simple linear regression was

Table 1. Brazilian list of primary care sensitive conditions.

Group of Causes	Code (ICD-10)
1. Preventable diseases by immunization and avoidable conditions	A33 – A35, B05, G00.0, A37, A36, A50, A51 A53, A15.0-A15.3, A16.0-A16.2, A17.0, A15.4 - A15.9, A16.3-A16.9, A17.1-A17.9, A18, A19, A95, B50-B54, B16
2. Infectious gastroenteritis and complications	A00-A09, E86
3. Iron deficiency anemia	D50
4. Nutritional deficiency	E40-E46, E50-E64
5. Ear, nose and throat infections	H66, J00-J03, J06, J31, I00-I02
6. Bacterial pneumonia	J13, J14, J15.2-J15.4, J15.8, J15.9, J17, J18
7. Ashtma	J45, J46
8. Chronic obstructive pulmonary disease	J20, J21, J40-J44, J47
9. Hypertension	I10, I11
10. Angina pectoris	I20, I24
11. Heart failure	I50, J81
12. Cerebrovascular diseases	I60-I69
13. Diabetes mellitus	E10-E14
14. Epilepsy	G40, G41
15. Kidney and urinary tract infection	N00, N10-N12, N15.9, N39.0, N30, N34
17. Pelvic inflammatory disease in women	N70-N73, N75, N76
18. Gastric ulcer with hemorrhage	K25.0-K25.2, K25.4-K25.6, K26.0-K26.2, K26.4-K26.6, K27.0-K27.2, K27.4-K27.6, K28.0-K28.2, K28.4-K28.6
19. Malignant uterine neoplasm	C53, C55
20. Prenatal and childbirth-related diseases	O23, P00, P35.0, P70.0, P70.1, B20-B24

Source: Ministry of Health. Primary Care Department. Workshop to elaborate the Brazilian list of hospitalization due to Ambulatory Care Sensitive Conditions. Belo Horizonte, MG, 9/12/2005.

used to calculate the R^2 value and confidence intervals for β values. The variables presented normal distribution and the adaptation to the regression model was tested by the residue analysis. The dependent variable was the hospitalization rate for ACSC per 10 thousand inhabitants, and the independent variable was the percentage of FHS population coverage in Brazil and in the Federation Units between 1998 and 2006.

This study has no conflict of interests and the research project was approved by the Research Ethics Committee of Universidade de Cruz Alta (Unicruz).

RESULTS

In Brazil, the number of FHS teams went from 3,062 in 1998, to 26,364, in 2006, representing a 861% increase. The ratio inhabitants per FHS reduced from 52,838 to 7,084 people assisted by FHS in the studied period, while the population coverage increased 748%. Hospitalizations for ACSC reduced 17% (Table 2).

Table 3 presents data referring to the number of teams, population coverage per FHS and hospitalization rate for ACSC in the Federation Unit in the first and in the last analyzed year.

Table 2. Number of Family Health Strategy units, Family Health Strategy per capita, estimates of population covered by Family Health Strategy and for Ambulatory Care Sensitive Conditions hospitalizations per 10 thousand inhabitants, Brazil, from 1998 to 2006.

Year	FHS	Inhabitants per FHS	Population covered by FHS (%)	Hospitalization for ACSC per 10 thousand inhabitants
1998	3,062	52,838,07	6.6	220.5
1999	4,220	38,850,10	9.0	221.4
2000	8,795	19,306,33	18.1	213.3
2001	13,245	13,015,16	26.9	206.7
2002	17,101	10,211,85	34.3	204.0
2003	19,444	9,096,70	38.5	199.2
2004	21,852	8,196,42	42.7	193.8
2005	25,301	7,279,72	48.1	187.4
2006	26,364	7,084,30	49.4	182.8

FHS: Family Health Strategy; ACSC: Ambulatory Care Sensitive Conditions

Table 3. Number of Family Health Strategy, Family Health Strategy and population covered by hospitalization for Ambulatory Care Sensitive Conditions per 10 thousand inhabitants, Brazilian States, 1998 and 2006.

Year	FHS		Population covered by FHS (%)		Hospitalization for ACSC per 10 thousand inhabitants	
	1998	2006	1998	2006	1998	2006
States						
Acre	10	127	6.9	58.3	201.0	230.6
Alagoas	178	698	22.9	68.5	232.1	197.4
Amapá	0	104	0	56.1	132.8	165.4
Amazonas	5	427	0.7	44.1	137.5	161.9
Bahia	10	2,204	0.2	51.1	243.8	195.4
Ceará	574	1,531	28.6	62.8	221.9	191.7
E. Santo	26	487	3.0	45.6	216.8	166.7
Goiás	10	996	0.7	60.8	219.7	209.3
Maranhão	10	1,592	0.7	90.1	226.8	176.6
M. Grosso	21	471	3.2	57.7	259.4	192.6
M. G. Sul	10	347	1.8	52.9	247.5	230.9
M. Gerais	758	3,442	15.5	61.8	230.4	185.0
Pará	39	649	2.4	31.9	236.9	218.5
Paraíba	39	1,185	4.1	114.5	232.4	197.6
Paraná	185	1,545	7.0	52.1	261.5	214.2
Pernambuco	240	1,185	11.2	48.8	239.2	190.1
Piauí	60	1,028	7.7	96.0	264.8	230.4
Rio Janeiro	58	1,328	1.5	29.9	219.5	151.3
R. G. Norte	34	828	4.5	79.4	223.8	165.5
R. G Sul	66	1,119	2.3	30.5	243.7	205.4
Rondônia	16	176	4.4	37.6	274.0	179.4
Roraima	0	92	0	71.4	181.2	154.2
S. Catarina	102	1,194	7.0	64.0	239.9	189.3
São Paulo	154	2,780	1.5	23.7	186.4	166.8
Sergipe	60	503	12.5	88.0	231.7	196.4
Tocantins	82	350	25.3	77.9	257.9	233.7

FHS: Family Health Strategy; ACSC: Ambulatory Care Sensitive Conditions.

The 26 Brazilian States presented increasing number of teams and FHS population coverage and, in 88.4% of the cases (23 Federation Units), there were reduced hospitalization rates for ACSC. Only three States in the North region presented increasing hospitalization rates: Acre, Amapá and Amazonas.

Table 4 presents the Pearson correlation values between the percentage of FHS coverage and the coefficient of hospitalizations for ACSC proportionally to 10 thousand inhabitants, according to the Federation Units. The bivariate analysis showed strong negative correlation between the FHS population coverage and avoidable hospitalizations in Brazil ($r = -0.867$; $p < 0.01$). In 38.4% (10 States), correlation was statistically significant and negative ($p < 0.05$; $r > -0.7$), thus showing that the increasing FHS coverage was associated with the reduced number of hospitalizations for ACSC. In 42.3% (13 States), there was a reduction in hospitalization rates, however, no statistically significant association. In only three States of the North region (Acre,

Table 4. Pearson correlation coefficient between the number of Family Health Strategy units and hospitalizations for ambulatory care sensitive conditions in Brazil and in the states, from 1998 to 2006.

States	Correlation Coefficient
Acre	0.704*
Alagoas	0.359
Amapá	0.580
Amazonas	0.925**
Bahia	-0.923**
Ceará	0.093
Espírito Santo	-0.521
Goiás	0.871**
Maranhão	-0.950**
Mato Grosso	-0.263
Mato Grosso do Sul	0.598
Minas Gerais	-0.845**
Pará	0.883**
Paraíba	-0.702*
Paraná	-0.845**
Pernambuco	-0.913**
Piauí	-0.404
Rio de Janeiro	-0.979**
Rio Grande do Norte	-0.906**
Rio Grande do Sul	-0.939**
Rondônia	-0.646
Roraima	0.248
Santa Catarina	-0.850**
São Paulo	0.579
Sergipe	-0.607
Tocantins	0.256
Brasil	-0.867**

* $p < 0.05$; ** $p < 0.01$; FHS: Family Health Strategy; ACSC: Ambulatory Care Sensitive Conditions.

Amazonas and Pará), hospitalization rates increased, and there was a positive correlation ($p < 0.05$) between FHS coverage and hospitalization for ACSC.

Table 5 presents the results of simple linear regression, and the outcome were hospitalizations for ACSC. It was possible to observe strong association between the more extensive FHS coverage and the reduced number of avoidable hospitalizations in Brazil ($\beta = -8.78$; $p < 0.01$).

DISCUSSION

The increasing FHS population coverage in Brazil was a gradual process, and, in the first four years of existence (1994-1998), it reached 6% of the population. In 1999, there were 4,114 FHS teams distributed in 30% of the cities, comprehending 14 million people and 9% of the country's population¹¹. In 2006, there were 26,364 FHS teams, reaching 49% of the population coverage.

Table 5. Simple linear regression model between the Family Health Strategy and hospitalizations for ambulatory care sensitive conditions in the states of Brazil, from 1998 to 2006.

States	R ²	β	95%CI	p-value
Acre	0.49	97.54	9.52 – 185.57	0.03
Alagoas	0.13	9.99	-13.22 – 33.12	NS
Amapá	0.34	84.06	-21.35 – 189.48	NS
Amazonas	0.86	126.10	79.92 – 172.27	< 0.01
Bahia	0.85	-76.29	-104.75 – -47.84	< 0.01
Ceará	0.01	2.42	-20.72 – 25.57	NS
Espírito Santo	0.27	-17.37	-42.77 – 8.03	NS
Goiás	0.76	48.99	24.25 – 73.74	< 0.01
Maranhão	0.90	-27.09	-35.01 – -19.16	< 0.01
Mato Grosso	0.07	-9.31	-39.87 – 21.25	NS
Mato Grosso do Sul	0.36	41.15	-8.09 – 90.40	NS
Minas Gerais	0.84	-31.23	-48.86 – -13.60	< 0.01
Pará	0.78	79.56	41.83 – 117.34	< 0.01
Paraíba	0.47	-20.27	-39.33 – -1.21	0.04
Paraná	0.71	-56.71	-88.78 – -24.65	< 0.01
Pernambuco	0.83	-48.99	-68.55 – -29.43	< 0.01
Piauí	0.16	-19.92	-60.17 – 20.33	NS
Rio de Janeiro	0.96	-166.51	-191.17 – -135.85	< 0.01
Rio Grande do Norte	0.82	-36.46	-51.68 – 21.23	< 0.01
Rio Grande do Sul	0.88	-65.66	-87.25 – -44.07	< 0.01
Rondônia	0.42	-85.85	-381.93 – 10.22	NS
Roraima	0.06	24.10	-60.09 – 108.28	NS
Santa Catarina	0.72	-28.47	-44.22 – -12.72	< 0.01
São Paulo	0.33	23.57	-6.08 – 53.22	NS
Sergipe	0.37	-33.56	-72.80 – 5.67	NS
Tocantins	0.06	10.39	-24.63 – 45.41	NS
Brasil	0.75	-28.78	-43.55 – -14.02	< 0.01

NS: Not significant.

The process of FHS implantation in Brazil was carried out with difficulties related to the application of financial resources, lack of professionals and lack of commitment from many cities with the primary care proposal^{8,13,17}. Financing related to population coverage led to the faster expansion of FHS in smaller cities¹⁷, but there were difficulties and insufficient coverage in large urban centers¹⁸. Besides, the heterogeneity of Brazilian States, especially concerning dimension, economic resources, access, availability of professionals and investments, and the political implication, also made it difficult to implement the FHS in Brazil¹³.

Brazilian studies indicate that FHS has presented successful results¹⁹⁻²¹, thus contributing with reduced hospitalization rates for ACSC^{19,22}, even though they are still high in the country. In this study, the declining number of hospitalizations for ACSC in Brazil became clear, thus corroborating investigations conducted in other regions and countries, in which it was possible to observe the relationship between the reduced number of hospitalizations for ACSC and the increasing primary care^{11,19-21,23-26}. On the other hand, when health care is performed by services who do not work with the FHS, there is significant increase in hospitalization rates for ACSC⁴. The longitudinal aspect of care provided by FHS professionals and the connection between users and workers contribute with the increasing resoluteness and with the reduction of hospitalizations^{13,27}.

Lower hospitalization rates for ACSC are related to the potential of FHS to work effectively on the main causes of avoidable hospitalizations. However, the reducing number of hospitalizations can also be a result of the insufficient number of beds and barriers in hospital access²⁷.

The low FHS population coverage leads to the reduced access to health services, the maintenance of the assistance perspective addressed to the disease and to the weaker emphasis on activities of promotion and prevention. When there is reduced number of health professionals in primary care, hospitalizations for ACSC increase. Therefore, hospitalization represents the outcome of itineraries in which the health problem was not resolved at primary care.

Other factors, like accessibility to the hospital, criteria adopted for hospitalization and health insurance coverage should also be considered for the analysis of hospitalizations for ACSC²⁸⁻³¹. Besides, it is known that elderly people³², with low income and schooling³³, are hospitalized more often, so this indicator increases in States in which the proportion of elder is higher.

The differences found between the Federation Units in avoidable hospitalization rates, concerning both the reduction and the rise, can also be related to structure factors, such as socioeconomic and cultural inequities. The low resoluteness of actions that are not so complex in the health system, together with the difficulties in the reference system, can also interfere in avoidable hospitalizations⁴.

Even though this study indicated strong association between the FHS coverage and hospitalizations for ACSC, some limits should be considered, including incorrect diagnoses corresponding to hospitalizations, which result in distorted information of the real profile of hospitalizations for ACSC¹⁷.

The findings concerning hospitalizations cannot be exclusively understood as a result of FHS actions, since this study did not control confounding factors by analyzing other

explanatory variables¹⁵. Also, this investigation did not consider the different financing policies of SUS hospitalizations, which concern the financing cap obtained by the number of hospitalizations or by decentralization policies and control of AIHs.

Anyway, the assessment of FHS impact on the health conditions of the population is important to readapt the primary care model^{11,19-21}, besides providing subsidies to quality health services⁶.

CONCLUSION

In this study, we analyzed hospitalization rates for ACSC, an indicator that evaluates the quality of care and the effectiveness of care provided by Primary Care. This indicator assumes that the occurrence of hospitalizations due to a sensitive cause to primary care is a result of the lack of opportune and effective attention to the problem, thus leading to the aggravation of the clinical condition and, consequently, to hospitalization.

Even though there may be other determinants, the amplification of Primary Care and FHS coverage in Brazil, in the past few years, contributed with the reduced number of hospitalizations for ACSC. We observed an association between these two events, even knowing that the magnitude of social inequities between States contributes with increasing disease load and interferes in the effectiveness of public health policies in all levels of care.

Many studies have pointed out to improvements in the quality of Primary Care in the country in the past years. Even so, the indicators hospitalizations for ACSC is still little used, and other investigations are necessary, based on complementary sources and different methodological approaches. It is suggested to conduct further studies about the theme, including the management of AIHs and their impact on the number of hospitalizations. We believe that these findings can lead to the analysis of some critical points of primary care in Brazil, assisting in the evaluation of health actions, especially of FHS.

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