

Rozania Maria Pereira Junqueira

Elisabeth Carmen Duarte

# Hospitalizations due to ambulatory care-sensitive conditions in the Federal District, Brazil, 2008

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## ABSTRACT

**OBJECTIVE:** To analyze hospitalization rates due to ambulatory care-sensitive conditions.

**METHODS:** The study used data from the Hospital Database of the Brazilian National Health System corresponding to the Federal District in the year of 2008. The main diagnosis for hospitalization was analyzed based on the International Classification of Diseases, and absolute frequency, proportion and coefficient were calculated according to causes, age groups and sex.

**RESULTS:** The ambulatory care-sensitive conditions (ACSC) represented approximately 20% of the hospital admissions in the National Health System. The most frequent conditions were: gastroenteritis (2.4%), heart failure (2.3%), and kidney and urinary tract infection (2.1%). The following aspects were verified: significant hospitalization rates due to ACSC in the infant group (< 1 year of age), an important reduction in the following age groups (1 to 29 years), and a gradual increase until the more advanced ages. Compared to men, hospitalization rates were slightly higher among young women (20 to 29 years) and lower among women older than 49 years.

**CONCLUSIONS:** Hospitalizations due to ACSC represented 19.5% of all hospital admissions in the Federal District (2008), and the main causes of hospitalizations were gastroenteritis, heart failure and kidney and urinary tract infection. The effectiveness of primary health care in preventing these events in the Federal District is discussed.

**DESCRIPTORS:** Primary Health Care, hospitalizations, Hospital Information System.

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## INTRODUCTION

Primary care in health promotion and the prevention of disease and hospitalizations, disability and early deaths, is greatly important. An effective primary care is associated with lower costs, higher customer satisfaction and better health indicators, even in situations of great social iniquity.<sup>5,12,a</sup> Structuring the primary health care services based on the Family Health Strategy (FHS), and covering the health needs of the population, is the main strategy in the reorientation of the health care model in Brazil. Good results are obtained in many countries,

Universidade de Brasília. Brasília, DF, Brasil

### Correspondence:

Rozania Maria Pereira Junqueira  
SQN 211 Bloco C, apto 109 – Asa Norte  
70863-030 - Brasília, DF, Brasil  
E-mail: rozania@unb.br

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<sup>a</sup> Starfield B. Atenção primária: equilíbrio entre necessidades de saúde, serviços e tecnologia. Brasília: Unesco/Ministério da Saúde; 2002.

where health systems are driven by FHS.<sup>b</sup> Even so, there are few evaluative tools that support performance monitoring in the primary health care, thus limiting the implementation of any necessary adjustments.

A list of hospitalizations due to Ambulatory Care-Sensitive Conditions (ACSC), published in Ordinance n°. 221 of the Brazilian Ministry of Health (MS) passed on 17 April 2008 was developed and recently validated in Brazil to support the evaluation and monitoring of the primary health care effectiveness.<sup>1c</sup>

ACSC comprise a number of health problems that can be prevented by timely and effective ambulatory care, control of acute events and managing of chronic diseases or conditions.<sup>2,4,7</sup> It refers to a set of events that would hardly progress to the point of requiring hospitalization, if properly handled through health promotion, prevention, early treatment and monitoring, at ambulatory level.<sup>3</sup>

Hospitalizations for infectious diseases preventable by immunization (measles, tetanus, diphtheria and others) can be avoided.<sup>7</sup> It is also possible to avoid diseases, such as gastroenteritis, whose complications can be alleviated by early diagnosis and treatment. If there is coverage and quality in primary health care, there will be a reduction in hospitalizations for acute complications caused by non-transmissible diseases (such as the diabetic coma), as well as a decrease in readmissions and length of hospitalization period due to different diseases.<sup>3</sup>

Hospitalizations due to ACSC has become a valuable tool for monitoring access to services and quality assessment of primary health care in the world, over the last decade.<sup>a</sup> With the adaptation and validation of a Brazilian list of hospitalizations due to ACSC, the study of these events is an important tool for health researchers and managers to assess the performance of primary health care services in Brazil.

The objective of this study was to analyze indicators of hospitalization due to ACSC.

## METHODS

A descriptive cross-sectional study on hospitalizations for ACSC and the total number of hospitalizations in the Federal District (DF), between January and December 2008, was carried out.

Hospital admission orders from the Hospital Database of the Brazilian National Health System (SIH-SUS),

which contains information identifying patients and related treatments, was the source of information on hospitalizations for ACSC. The variables included: patient individual characteristics, clinical information and primary diagnosis for admission.

The tables containing the ACSC distribution were based on the variable “main diagnosis” from the code of the International Classification of Diseases – 10<sup>th</sup> Revision (ICD-10) and from the primary diagnosis for hospital admission, available in the SIH-SUS database.

In 2008, the number of hospitalizations through the SUS was 188,106. The hospitalizations related to childbirth (31,103) were excluded because they represent the natural outcome of pregnancy and are influenced by the fertilization rate, according to method adopted by other authors.<sup>1</sup> Thus, the proportions and the coefficients of 157,003 hospital admissions were analyzed.

The Microsoft Office Excel and IBM-SPSS 16.0 softwares were used for encoding and classifying the hospitalizations due to ACSC.

The study was approved by the Research Ethics Committee of the Faculty of Medicine, Universidade de Brasília (CEP-FM 001/2010).

## RESULTS

ACSC were responsible for 19.5% of hospital admissions through the SUS (coefficient of 121 per 10,000 inhabitants – Table).

The DF has an estimated population of 2,557,158 inhabitants<sup>d</sup> and is surrounded by 42 small and mid-sized towns belonging to the states of Goiás and Minas Gerais, which are also known as the *entorno* region. The DF has low coverage regarding the Family Health Strategy service (FHS, 5.6% in 2008) and Community Health Agents (CHA, 39 teams).<sup>10</sup> The supply and demand for health services in the DF are affected, among other factors, by patients living in the *entorno* region: 11% of emergency treatments and 20% of hospitalizations in the DF are related to non-residents.<sup>e</sup> Thus, hospitalizations due to ACSC reflect not only the flaws of primary care in the DF, but also part of the unmet needs in health care in the *entorno* region.

The analysis of the main diagnoses of hospitalization due to ACSC are shown in the Table. Gastroenteritis accounted for the largest proportion of hospitalizations

<sup>b</sup> Perpétuo IO, Wong LR. Atenção hospitalar por condições sensíveis à atenção ambulatorial (CSAA) e as mudanças no seu padrão etário: uma análise exploratória dos dados de Minas Gerais. In: Anais do Seminário de Economia Mineira. Belo Horizonte: Editora UFMG; 2007.

<sup>c</sup> Ministério da Saúde. Portaria no 221, de 17 de abril de 2008. Define que a lista brasileira de internações por condições sensíveis à atenção primária. *Diário Oficial Uniao*. 18 abr 2008;Seção1:70-1.

<sup>d</sup> Instituto Brasileiro de Geografia e Estatística. Censos demográficos. Brasília; 2010[ citado 2010 set 13]. Disponível em: <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/>

<sup>e</sup> Vinhadelli JS. Análise macroeconômica preliminar dos gastos em saúde do Distrito Federal no período de 2006-2008 [dissertação de mestrado]. Rio de Janeiro: Escola Nacional de Saúde Pública Sérgio Arouca da Fiocruz; 2010.

**Table.** Absolute frequency, proportion (%) and hospitalization rates (per 10,000 inhabitants) due to ambulatory care-sensitive conditions (ACSC), according to diagnostic groups registered through the hospital admission order (HAO)<sup>a</sup>, performed in the hospital network of the Brazilian National Health System (SUS). Brazil and the Federal District (DF), 2008.

Diagnose groups	DF					Brazil	
	International Classification of Diseases - ICD 10	Total hospitalizations due to ACSC	Proportion (per 100 hospitalizations due to ACSC)	Proportion (per 100 hospitalizations due to all causes)	Rate (per 10,000 inhabitants)	Rate (per 10,000 inhabitants) <sup>1</sup>	
1. Preventable diseases through 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, B77	322	1.0	0.2	1.25	0.2	
2. Infectious and complicated gastroenteritis	E86, A00-A09	3,804	12.45	2.42	14.87	34.7	
3. Anemia	D50	423	1.38	0.27	1.65	1.0	
4. Nutritional deficiencies	E40-E46, E50-E64	353	1.15	0.22	1.38	3.0	
5. Ear, nose and throat infections	H66, J00-J03, J06, J31	697	2.28	0.44	2.72	0.6	
6. Bacterial pneumonias	J13-J14, J15.3-J15.4, J15.8-J15.9, J18.1	2,586	8.46	1.65	10.11	11.0	
7. Asthma	J45-J46	0	0	0	0	14.5	
8. Lower respiratory diseases	J20, J21, J40-J44, J47	1,714	5.61	1.09	6.70	11.0	
9. Hypertension	I10-I11	1,690	5.53	1.08	6.60	7.8	
10. Angina	I20	1,180	3.86	0.75	4.61	5.2	
11. Heart failure	I50, J81	3,672	12.02	2.34	14.35	16.8	
12. Cerebrovascular diseases	I63-I67, I69, G45-G46	2,594	8.49	1.65	10.14	9.7	
13. Diabetes mellitus	E10-E14	2,675	8.75	1.70	10.46	6.5	
14. Epilepsies	G40-G41	1,269	4.15	0.81	4.96	2.8	
15. Kidney and urinary tract infections	N10-N12, N30, N34, N39.0	3,365	11.01	2.14	13.16	10.7	
16. Skin and subcutaneous tissue infections	A46, L01-L04, L08	2,073	6.78	1.32	8.10	4.1	
17. Inflammatory diseases of female pelvic organs	N70-N73, N75-N76	459	1.50	0.29	3.43	2.6	
18. Gastrointestinal ulcer	K25-K28, K92.0, K92.1, K92.2	811	2.65	0.52	3.17	4.8	
19. Diseases related to pregnancy	O23, A50, P35.0	861	2.81	0.55	6.73	1.1	
20. Total hospitalizations due to ambulatory care-sensitive conditions		30,548	100	19.46	121.02	149.6	

<sup>a</sup> HAO: hospital admission order

due to ACSC (12.4%; hospitalization rate of 14.9 per 10,000 inhabitants). The second most frequent cause was heart failure (12%; 14.3 per 10,000), followed by kidney and urinary tract infections (11%; 13.2 per 10,000). These health problems accounted for 35.4% of hospitalizations due to ACSC and 6.9% of hospitalizations through the SUS during the studied period.

Other relevant causes were diabetes *mellitus* (8.7%; 10.5 per 10,000), cerebrovascular diseases (8.5%; 10.1 per 10,000), bacterial pneumonia (8.5%; 10.1 per 10,000) and skin and subcutaneous tissue infections (6.8%; 8.10 per 10,000). Lower respiratory diseases (5.61%, 6.70 per 10,000) and hypertension (5.5%, 6.6 per 10,000) were also causes of hospitalization.

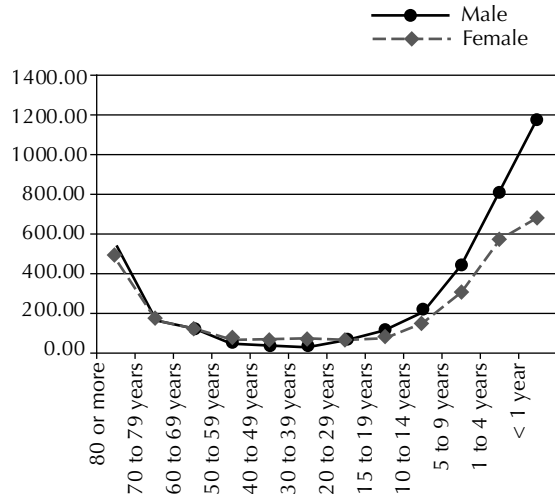
Significant hospitalization rates due to ACSC were observed in young children (< 1 year), with a significant decrease in the successive age groups, up to 30 to 39 years. A gradual increase in the age groups above 40 years was also observed. There were no significant differences in the hospitalization rates related to gender up to 39 years of age, except for a slight increase in relation to female patients in the 20 to 29 years age group. Higher hospitalization rates due to ACSC were observed in males when compared to females, at 40 years of age or older (Figure 1).

Lower hospitalization rates due to ACSC were identified among women from the 10 to 14 years to the 50 to 59 years age group. In contrast, among males, lower hospitalization rates due to ACSC is persistent only up to 40 to 49 years age group.

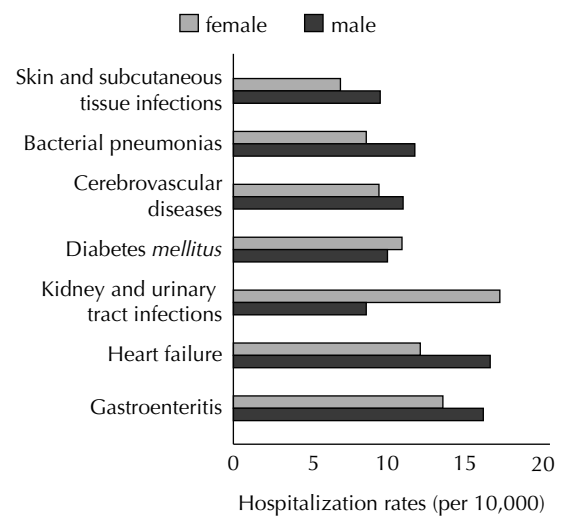
Hospitalizations due to gastroenteritis, heart failure, cerebrovascular diseases, bacterial pneumonia and skin and subcutaneous tissue infections occurred more frequently in males (Figure 2).

The hospitalization rate due to kidney and urinary tract infections was almost double among women, whereas the coefficient related to diabetes *mellitus* was only slightly higher in females (Figure 3).

The hospitalization rate due to gastroenteritis was more relevant in patients younger than 9 years and slightly more common in males (Figures 2 and 3). The hospitalization rate due to heart failure and cerebrovascular diseases were higher after 60 years of age, and more relevant among men. The hospitalization rate due to diabetes *mellitus* showed an increase in patients older than 60 years, especially among those older than 70 years, being more relevant in women. The hospitalization rate due to bacterial pneumonia showed a slight relevance, preferably reaching the over 5 years age group and the elderly over 70 years of age to a lesser extent, and with greater relevance among men. The hospitalization rate due to kidney and urinary tract infections was relevant in all female age groups, including the 20 to 29 years age group. This cause of



**Figure 1.** Hospitalization rates due to ambulatory care-sensitive conditions, by age and gender (per 10,000). Federal District, 2008.

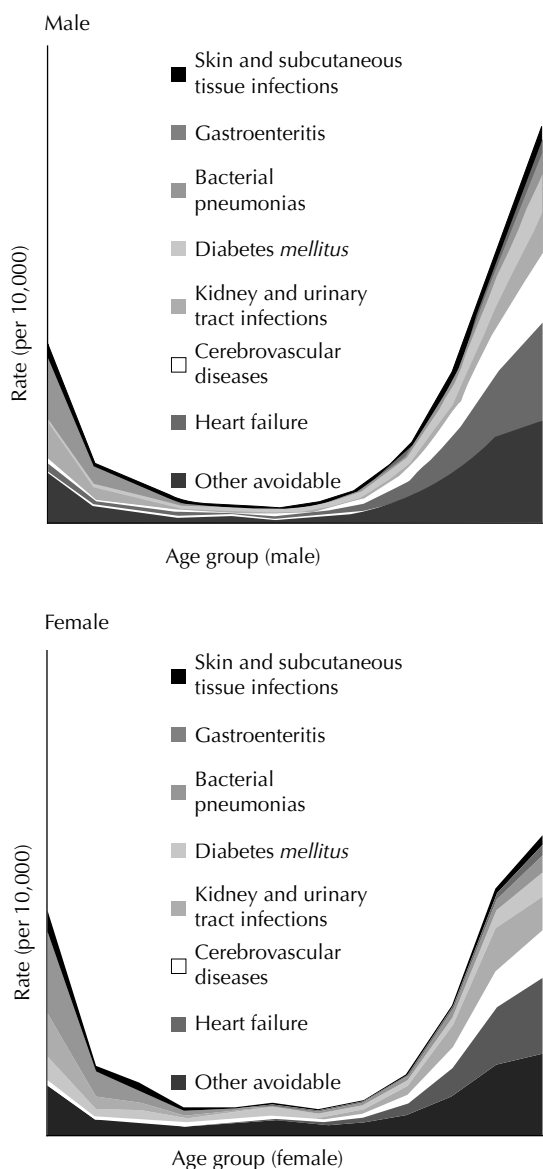


**Figure 2.** Number of hospitalizations due to ambulatory care-sensitive conditions, by gender. Federal District, Brazil, 2008.

hospitalization could be identified with some relevance in elderly men.

**DISCUSSION**

The results showed that the hospitalization rate due to ACSC was 121 per 10,000 inhabitants, representing 19.5% of total hospitalizations. The three leading causes of hospitalization due to ACSC were: gastroenteritis, heart failure and kidney and urinary tract infections. This set of causes for hospitalizations (35.4% of total hospitalizations due to ACSC and 6.9% of the total hospitalizations through the SUS) is considered sensitive to primary care, because the effective attention at this level of care could prevent such events. These



**Figure 3.** Hospitalization rate in the SUS due to ambulatory care-sensitive conditions, by cause and age, according to gender (per 10,000). Federal District, Brazil, 2008.

hospitalizations represent a warning sign that should be considered by managers and health professionals in the SUS, in order to identify flaws in primary care in the DF and *entorno* region.

Some authors present plausible evidence for these assumptions; however, controversial results are discussed in the literature, possibly due to difficulties in the methodological approach.<sup>5,8,9</sup> Through a literature review on hospitalizations for ACSC and the exposure to at least one characteristic of primary health care (18

articles in the past 13 years) it has been found that most studies pointed to a protective association of variables of structure, process and performance of primary care services, in relation to the risk of hospitalizations due to ACSC.<sup>8</sup> Preventive consultations (sporadic or not), vaccines and ongoing child health care were associated, in various studies, with lower risk of hospitalization due to ACSC.<sup>8</sup> The authors found no consistent results for associations between the care model (closer to or further away from the principles of primary health care) and the risk of hospitalization for ACSC.<sup>8</sup>

Elias & Magajewski<sup>5</sup> analyzed the association between the adequacy of primary care and rates of hospitalization due to ACSC in the state of Santa Catarina. The authors classified the primary health care of the selected municipalities as adequate or inadequate, according to coverage and quality criteria, and described the trends in rates of hospitalization due to ACSC through the SUS in these municipalities. More favorable results, but with no statistical significance, were observed in the trends and magnitudes of these rates of hospitalization in the municipalities with adequate primary care when compared to those classified as inadequate.<sup>5</sup> A study carried out in Bagé, Southern Brazil,<sup>9</sup> showed a protective statistically significant association between hospitalizations due to ACSC and residency in areas where there was "organization of the primary health care (according to the manager's assessment)", when there was a traditional primary care model.<sup>9</sup> However, the authors show divergent results to those previously described.

In this study, 19.5% of hospital admissions through the SUS were classified as ACSC. In a study performed in Brazil,<sup>1</sup> this proportion was 28.5%, slightly higher than the data found for the DF. In Bagé,<sup>9</sup> however, the results contrast with those reported previously and indicate that 42.6% of hospitalizations were due to ACSC. The present study found that the coefficient of hospitalization due to ACSC (121 per 10,000 inhabitants in 2008) in the DF was slightly lower than that observed for Brazil (149.6 per 10,000 in 2006) and very different to the observed for Minas Gerais (208.7 per 10,000).<sup>a</sup>

Smaller rate and proportion of hospitalizations due to ACSC, compared to those found in the literature, may be related to specific living conditions of DF patients. According to the United Nations Human Development Program (2010),<sup>f</sup> the Human Development Index (HDI) for the DF in 2005 was 0.874, the highest of all Federative Units of Brazil; income, longevity and education indices were also higher. On the other hand, there is low coverage of Family Health Strategy service in the DF (5.6% in 2008, according to the Ministry of Health), which is attended by 39 teams, as well as the program of Community Health Agents (13.6% in 2008).<sup>g</sup>

<sup>f</sup> Programa das Nações Unidas para o Desenvolvimento. Desenvolvimento Humano e IDH. Brasília;[s.d.][citado 01 nov 2010]. Disponível em: [www.pnud.org.br/idh](http://www.pnud.org.br/idh)

<sup>g</sup> Ministério da Saúde (BR). Departamento de Atenção Básica/ SAS. Brasília;[s.d.][citado 01 nov 2010]. Disponível em: [www.saude.gov.br/sas](http://www.saude.gov.br/sas)

Similarly to the DF, the most frequent cause of hospitalization due to ACSC in Brazil<sup>1</sup> was gastroenteritis, followed by heart failure and bacterial pneumonia. In a study conducted in Minas Gerais<sup>a</sup>, the three major ACSC linked to hospitalizations were (in this order): bacterial pneumonia, heart failure and gastroenteritis. The hospitalization rate due to gastroenteritis was the highest within the ACSC identified in the DF in 2008, particularly affecting children under 5 years of age. This finding is indicative of flaws in preventive and curative services, in the primary care sphere, which should be timely and decisive at the first manifestations of such event in this age group, thus preventing hospitalization. The oral rehydration solution – an intervention of low technological demand and cost – showed great effectiveness in preventing deaths from gastroenteritis in Brazil, according to previous studies.<sup>15</sup> The hospitalization rate due to gastroenteritis in the DF (14.9 per 10,000) represents half of the estimated rate for Brazil (34.7 per 10,000), and is slightly lower than that observed in Minas Gerais (19.5 per 10,000).<sup>a</sup> The mean estimated value of this indicator for Brazil is strongly influenced by regions with poor living conditions, sanitation and health care, such as some remote areas in the North and Northeast regions, which offer different living conditions when compared to the DF. Moreover, the paradox of observing such high rate of hospitalizations for gastroenteritis, the most frequent cause of hospitalization due to ACSC, in a Federative Unit with a high HDI deserves reflection.

The high rates of hospitalization due to heart failure in the DF (14.35 per 10,000), especially among the elderly, confirm data related to Brazil<sup>1</sup> (16.8 per 10,000), where this is the second most frequent cause of hospitalization due to ACSC. However, this indicator is markedly lower than the hospitalization rate for this cause in Minas Gerais (30 per 10,000).<sup>a</sup> The main risk factors known for heart failure are hypertension, smoking, obesity, sedentary lifestyle and familial history. Being the DF a young Federative Unit, the proportion of elderly (7.16% were 60 years or older in 2009) is below the national average level (10.15%), which reinforces the need to investigate the prevalence of risk factors associated with these events, as well as the quality of care received in the primary health care network.<sup>h</sup>

The major hospitalization rates in the DF were due to kidney and urinary tract infections (13.2 per 10,000), especially in females in all age groups, but particularly among young women from 20 to 29 years. The magnitude of this indicator in the DF was not different from those found in other studies. This rate was 10.7 per 10,000 for Brazil and 12.6 per 10,000 inhabitants in Minas Gerais.<sup>1,a</sup>

On the other hand, the hospitalization rate due to infection of the ear, nose and throat is four times higher in the DF (2.72 per 10,000) than the national average (0.6 per 10,000). This should be investigated through more detailed studies to elucidate the causes of such high rates in the DF.

The elderly showed the most relevant coefficients of hospitalization due to ACSC in the DF, similar to those described by Perpetuo & Wong<sup>b</sup> (2006) for Minas Gerais. The most frequent causes were heart failure, cerebrovascular diseases and diabetes *mellitus*. In Santa Catarina<sup>5</sup> between 1999 and 2004, one of the ACSC analyzed was diabetes *mellitus* and its association with the adequacy of primary care estimated by the coverage and quality of service. Hospitalizations for diabetes *mellitus* tended to have a steeper decline in the population with adequate ambulatory care than among municipalities without this service, suggesting vulnerability of this event to the good quality primary health actions.

The hospitalization rate due to ACSC among children under 1 year of age were relevant in the DF, as described in other studies.<sup>3</sup> The most frequent causes were gastroenteritis and bacterial pneumonia, events that require low complexity attention for their diagnosis and management, when timely handled.

In general, in the absence of effective prevention of hospitalization due to ACSC, it is possible to anticipate increased hospital costs and use of hospital beds, which could otherwise be available to patients in more serious conditions. Further studies are needed to examine the factors associated with hospitalizations due to ACSC, including evaluative research on the quality and coverage of primary care available in the DF. It will also be necessary to expand the understanding on the process of health care use by the population residing in the different areas of this Federative Unit. The analysis of the “therapeutic itinerary” covered by the SUS patient in a given territory is an approach proposed to understand the complex web of events involved in the search for health care.<sup>6</sup> To know the itinerary of the patients hospitalized due to ACSC in the DF and the flaws in this process would be very useful. The present study has limitations. The main purpose of the data recorded in the hospital admission orders is reimbursement to the hospital for the services provided. There may be flaws in this record (intentional or not) that may compromise the accuracy of the variables, especially the diagnosis used to identify hospitalizations due to ACSC.

Some authors analyze the quality of the data found in the SIH/SUS forms. Veras & Martins<sup>11</sup> analyzed the correlation of variables contained in SIH/SUS forms with data from medical records and found that, for the primary diagnosis (high frequency), this concordance

<sup>h</sup> Instituto Brasileiro de Geografia e Estatística (BR). DATASUS. Brasília; 2008 [citado 1 nov 2010]. Disponível em: [www.datasus.gov.br](http://www.datasus.gov.br)

ranged from 0.72 (considering four-digit ICD coding) and 0.81 (considering three-digit ICD coding). Moreover, the hospital admission order is part of a system of national coverage, but only refers to the SUS services. Thus, caution should be taken when generalizing these results to the population using the private health care network.

The results of this analysis, as well as future studies in the DF on this topic, may assist managers in implementing

actions aimed to a greater functionality in primary care, reduced spending on highly complex procedures and optimizing the use of available resources (e.g. hospital beds) that usually fall short of demand. The future longitudinal monitoring of these ACSC allow, even if indirectly, to estimate the performance indicators associated with primary health care in the DF and *entorno* region and measure the impact of interventions implemented at this level of attention. This study can be viewed as a baseline for evaluation processes of this nature.

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