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Hospitalization of older adults due to ambulatory care sensitive conditions

Internação de idosos por condições sensíveis à atenção primária à saúde

ABSTRACT

OBJECTIVE: To analyze the temporal evolution of the hospitalization of older adults due to ambulatory care sensitive conditions according to their structure, magnitude and causes.

METHODS: Cross-sectional study based on data from the Hospital Information System of the Brazilian Unified Health System and from the Primary Care Information System, referring to people aged 60 to 74 years living in the state of Rio de Janeiro, Southeastern Brazil. The proportion and rate of hospitalizations due to ambulatory care sensitive conditions were calculated, both the global rate and, according to diagnoses, the most prevalent ones. The coverage of the Family Health Strategy and the number of medical consultations attended by older adults in primary care were estimated. To analyze the indicators' impact on hospitalizations, a linear correlation test was used.

RESULTS: We found an intense reduction in hospitalizations due to ambulatory care sensitive conditions for all causes and age groups. Heart failure, cerebrovascular diseases and chronic obstructive pulmonary diseases concentrated 50.0% of the hospitalizations. Adults older than 69 years had a higher risk of hospitalization due to one of these causes. We observed a higher risk of hospitalization among men. A negative correlation was found between the hospitalizations and the indicators of access to primary care.

CONCLUSIONS: Primary healthcare in the state of Rio de Janeiro has been significantly impacting the hospital morbidity of the older population. Studies of hospitalizations due to ambulatory care sensitive conditions can aid the identification of the main causes that are sensitive to the intervention of the health services, in order to indicate which actions are more effective to reduce hospitalizations and to increase the population's quality of life.

DESCRIPTORS: Aged. Hospitalization. Ambulatory Care. Primary Health Care.

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Received: 9/11/2013

Approved: 6/1/2014

RESUMO

OBJETIVO: Analisar a evolução temporal da internação de idosos por condições sensíveis à atenção primária à saúde segundo sua estrutura, magnitude e causas.

MÉTODOS: Estudo transversal com base em dados do Sistema de Informação Hospitalar do Sistema Único de Saúde e do Sistema de Informação da Atenção Básica referentes a pessoas com idade entre 60 e 74 anos, residentes no estado do Rio de Janeiro. Foram calculadas a proporção e taxa de internações por condições sensíveis à atenção primária global e segundo diagnóstico mais prevalentes. Foram estimadas a cobertura da Estratégia de Saúde da Família e o número de consultas médicas realizadas por idosos na atenção primária. Para analisar o impacto dos indicadores nas internações foi realizado teste de correlação linear.

RESULTADOS: Encontrou-se acentuada redução das internações por condições sensíveis à atenção primária para todas as causas e grupos etários. Insuficiências cardíacas, doenças cerebrovasculares e pulmonares obstrutivas crônicas acumularam 50,0% das internações. Idosos com mais de 69 anos tiveram maior risco de internação por alguma dessas causas. Observou-se maior risco de internação entre os homens. Foi encontrada correlação negativa entre as internações e os indicadores de acesso à atenção primária.

CONCLUSÕES: A atenção primária em saúde no estado do Rio de Janeiro vem provocando impactos significativos na morbidade hospitalar da população idosa. Estudos das internações por condições sensíveis à atenção primária podem auxiliar na identificação das principais causas sensíveis à intervenção dos serviços de saúde, indicando quais ações são mais efetivas para a diminuição das internações e o aumento da qualidade de vida da população.

DESCRITORES: Idoso. Hospitalização. Assistência Ambulatorial. Atenção Primária à Saúde.

INTRODUCTION

Hospitalization, although necessary, may pose a high risk for health, especially for older adults. Studies have shown that, in this age group, hospitalization implies risks of immobility, incontinence, malnutrition, depression, development of comorbidities, cognitive decline, deterioration of functional capacity and even death.^{7,20,25,26} Nunes¹⁵ has shown that higher costs on older adults' health derive mainly from repeated hospitalizations. According to data from the *Sistema de Informações Hospitalares do Sistema Único de Saúde* (SIH/SUS – Hospital Information System of the Brazilian Unified Health System)^a in the state of Rio de Janeiro, Southeastern Brazil, between 2008 and 2012, expenditure on hospitalizations of people aged 60 to 74 years due to heart failure, bronchitis, asthma and sepsis totaled approximately R\$57 million. Thus, preventing hospitalizations in this population is relevant because of

issues related to older adults' health and quality of life and also because of economy in public health.

The role of primary care is internationally recognized in the prevention of diseases and health problems.^{11,23} In Brazil, primary care constitutes the main entrance gate to the Brazilian Unified Health System (SUS), and the *Estratégia de Saúde da Família* (ESF – Family Health Strategy) is a pillar in the implementation of the Brazilian health policy.²¹

Billings et al² have proposed to monitor the indicator hospitalizations for ambulatory care sensitive conditions (HACSC) to measure its performance. They consider that high hospitalization rates due to certain diseases reflect problems and difficulties in access to healthcare services and the low resolving power of the services. Billings et al² have listed the diseases and health problems (such as diabetes, asthma and

^a Ministério da Saúde. Informações de Saúde. Brasília (DF);1991 [cited 2013 Jun 20]. Available from: <http://www.datasus.gov.br>

hypertension) which, with timely and effective care provided in the primary healthcare level, should not lead to hospitalization. In 2008, the Brazilian government, through a Directive of the Ministry of Health (SAS/MS 221),^b recommended the use of the HACSC indicator to evaluate primary care in the country.

Studies have shown the robustness of the HACSC indicator regarding the assessment of the performance of the health system, as it has been broadly used in research referring to children or to the population in general.^{4,6,9} In Brazil, no studies have employed the indicator specifically with older adults. International studies^{3,9} have shown higher HACSC rates among people aged 60 or older compared to other age groups. Jackson & Tobias⁹ have observed that efficient actions and programs in primary care contribute significantly to reduce hospitalizations and to improve the quality of life among people aged up to 74 years, in New Zealand.

The recent indicator “premature deaths up to 70 years of age due to non-communicable diseases” is present in the Strategic Action Plan for Fighting against Chronic Non-Communicable Diseases in Brazil^c and in the *Contrato Organizativo da Ação Pública de Saúde* (COAP – Organizational Contract of Public Health Actions),^d both based on the determinations of the World Health Organization.^e The indicator shows that the notion of preventability should not be applied only to children and young individuals; it must be extended to more advanced ages.

This study aimed to analyze the temporal evolution of older adults’ hospitalization due to ambulatory care sensitive conditions according to their structure, magnitude and causes.

METHODS

Cross-sectional study with a population of older adults aged 60 to 74 years, living in the state of Rio de Janeiro, in the period from 2000 to 2010. This age limit was adopted in view of the fact that the increase in comorbidities from 75 years of age onwards hinders the analysis of the underlying cause of the morbidity and, consequently, the identification of older adults with diseases that should be treated in primary care to prevent hospitalization.⁹ The state of Rio de Janeiro was chosen due to its high aging level and the recent

expansion of the ESF, whose coverage increased from 9.0% to 31.0% between 2000 and 2010.^f

Hospitalization information contained in the SIH/SUS was used, as well as information on older adults’ enrolment in the ESF and on consultations attended in primary care, in the same period, contained in the *Sistema de Informações sobre a Atenção Básica* (SIAB – Primary Care Information System). The 2000 and 2010 information on the older population was obtained from demographic censuses and, for the intercensus years, the population estimated by geometric interpolation was used, considering sex and age group. The information was obtained from the website of the *Departamento de Informação em Saúde* (DATASUS – Health Information Department).

The causes of hospitalization of older adults that were considered sensitive to ambulatory care are published in Directive 221 of the Ministry of Health (April 17, 2008),^b except those related to prenatal care and delivery, which do not apply to this population. The list of HACSC is formed by the following causes: diseases preventable by immunization and sensitive conditions (A15 to A19, A33 to A37, A51 to A53, A95, B05, B06, B16, B26, G00.0, B50 to B54 and I00 to I02), infectious gastroenteritis and complications (A00 to A09 and E86), anemia (D50), nutritional deficiencies (E40 to E46 and E50 to E64), infections of the ear, nose and throat (H66, J00 to J03, J06 and J31), bacterial pneumonias (J13, J14, J15.3, J15.4, J15.8, J15.9 and J18.1), asthma (J45 and J46), pulmonary diseases (J20 to J21, J40 to J44 and J47), hypertension (I10 and I11), angina (I20), heart failure (I50 and J81), cerebrovascular diseases (I63 to I67, I69, G45 and G46), diabetes mellitus (E10 to E14), epilepsy (G40 and G41), kidney and urinary tract infection (N10 to N12, N30, N34 and N39.0), skin and subcutaneous tissue infection (A46, L01 to L04 and L08), inflammatory disease of female pelvic organs (N70 to N76), and gastrointestinal ulcer (K25 to K28, K92.0, K92.1 and K92.2).

To analyze the temporal evolution of the HACSC by sex and age group (60-64, 65-69 and 70-74), two indicators were used. The first corresponds to the annual HACSC rate in the period from 2000 to 2010, and the second was the relative percentage variation (RPV) of the HACSC rates of the main causes, based on the year 2000 and calculated in the following way:

$$RPV_{\chi} = \frac{HACSC\ rate\ year\ \chi - HACSC\ rate\ year\ 2000}{HACSC\ rate\ year\ 2000} \times 100, \chi = 2001, \dots, 2010$$

^b Ministério da Saúde. Secretaria de Atenção à Saúde. Lista Brasileira de Condições Sensíveis a Atenção Básica. Portaria nº 221 de 17 de abril de 2008. *Diário Oficial*. 21 set 2008.

^c Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise de Situação de Saúde. Plano de ações estratégicas para o enfrentamento das doenças crônicas não transmissíveis (DCNT) no Brasil 2011-2022. Brasília (DF); 2011.

^d Ministério da Saúde. COAP. Decreto nº 7.508, de 28 de junho de 2011. Regulamenta a Lei nº 8.080, de 19 de setembro de 1990, para dispor sobre a organização do Sistema Único de Saúde - SUS, o planejamento da saúde, a assistência à saúde e a articulação interfederativa, e dá outras providências. *Diário Oficial*. 29 jun 2011:1.

^e United Nations. General Assembly. Political declaration of the high-level meeting of the General Assembly on the prevention and control of non-communicable diseases. Geneva; 2011.

^f Ministério da Saúde. Informações de saúde. Brasília (DF); 2013 [cited 2013 Sept 3]. Available from: <http://www.datasus.gov.br>

To identify changes in the structure of the HACSC causes in the decade and compare with the general hospitalization causes, the proportion of hospitalizations according to causes by chapters and subchapters of the Internal Classification of Diseases (ICD-10) was estimated for the years 2000 and 2010. Hospitalization rates were calculated only for the main causes, defined as those that presented higher numbers of hospitalizations.

Sex differences according to HACSC causes were analyzed through the sex ratio indicator, in which the HACSC rate of the older population of the male sex is divided by the rate of the older population of the female sex.

The relationship between the HACSC trend in the last decade and access to primary care in Rio de Janeiro was analyzed through correlation tests between the HACSC rate in the period from 2000 to 2010 and indicators of access to primary care services (number of consultations per 1,000 inhabitants and ESF coverage). The linear dependence between these factors was measured by Pearson's Correlation Coefficient.

RESULTS

Between 2000 and 2010, there was a reduction in the absolute number of hospitalizations of older adults aged 60 to 74 years in Rio de Janeiro. In 2010, there were 19,690 hospitalizations less than in 2000 in this age

group, which corresponds to a 16.8% reduction. There was also a reduction in HACSC between these two years. In 2000, there were 49,316 HACSC and in 2010, 30,871, which correspond, respectively, to 42.1% and 31.7% of all the hospitalizations that occurred in Rio de Janeiro in the period. Thus, we observed that almost the total reduction in the hospitalizations between these two years corresponds to HACSC, as there were 18,445 less HACSC in the analyzed period (Table 1).

Figure 1 shows the decreasing trend in the HACSC rates during the entire decade, for both sexes and all the age groups of older adults, but mainly for men aged 70 to 74 years. Older men had higher HACSC rates than older women in the entire decade. Both sexes presented a reduction in HACSC rates of approximately 50.0%, but the gender difference persisted. Between 2000 and 2010, the rate per 1,000 older inhabitants decreased, respectively, from 52.4/1,000 to 25.9/1,000 for men and from 34.9/1,000 to 16.3/1,000 for women (Table 2).

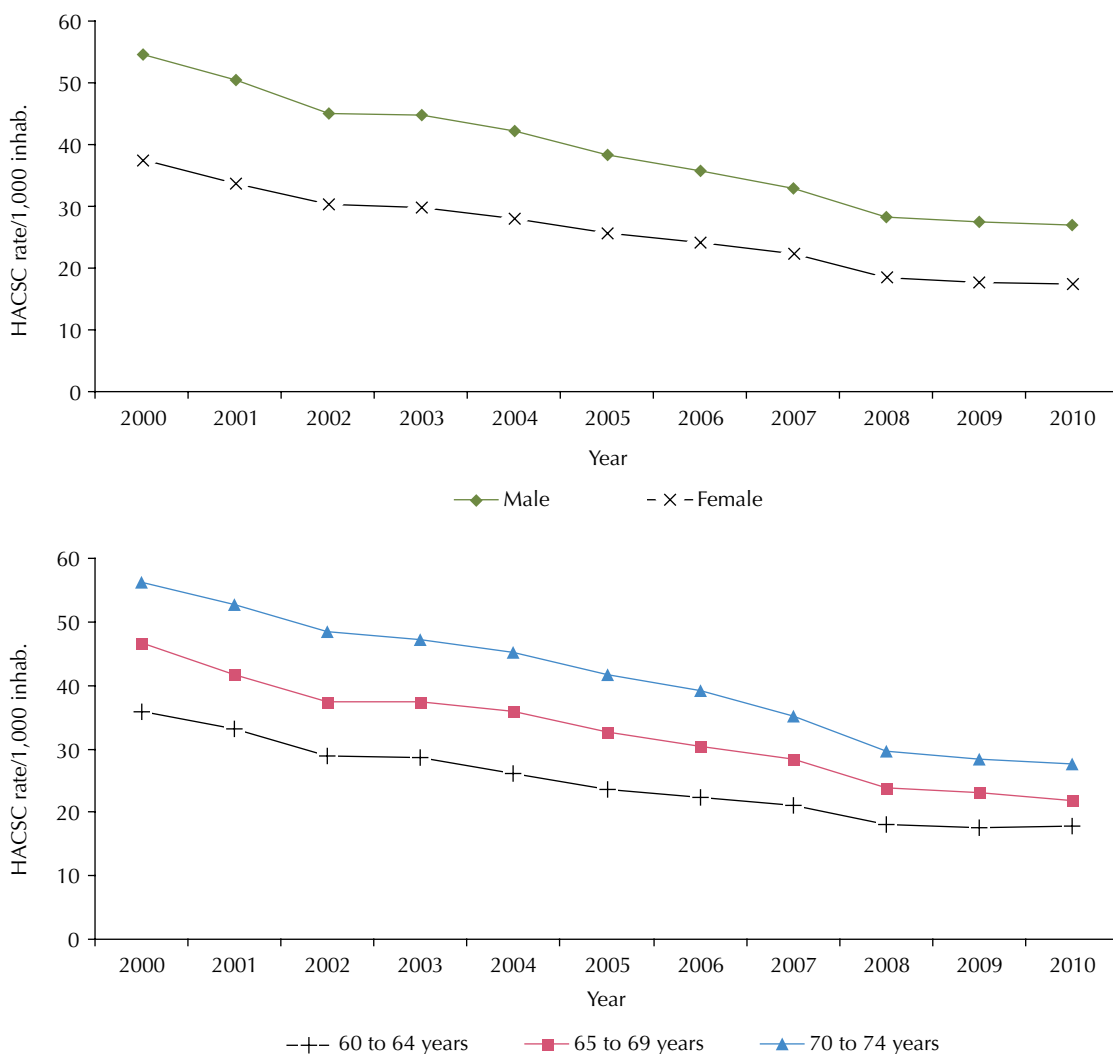
Older adults with more advanced ages presented a higher risk of hospitalizations, but it was in this age group that the highest reduction of the decade occurred. In 2000, the group of older adults aged 70 to 74 years presented HACSC rates of approximately 56 per 1,000 inhabitants, while older adults aged 60 to 64 years presented a rate of 36 per 1,000. In 2010, these rates were approximately 28/1,000 for the age group 70 to 74 years and 18/1,000 for the older adults aged 64 to 69 years (Figure 1).

Table 1. Proportion of the main causes of hospitalizations of older adults due to ambulatory care sensitive conditions and weight in the total number of hospitalizations. Rio de Janeiro, Southeastern Brazil, 2000 and 2010.

ICD-10 – Chapter and cause	Proportion of hospitalizations of older adults due to HACSC (%)		Weight of each cause in the total of HACSC (%)	
	2000	2010	2000	2010
IX. Circulatory system	21.3	15.5	50.6	49.0
Heart failure (I50)	11.7	7.5	27.7	23.5
Cerebrovascular diseases (I63-I69, G45 and G46)	7.0	5.6	16.7	17.6
Angina (I20)	1.7	2.2	4.1	6.8
Hypertension (I10-I15)	3.2	2.0	7.6	6.3
X. Respiratory system	7.6	4.2	18.1	13.3
Chronic obstructive pulmonary diseases (J20-J21, J40-J44 and J47)	6.0	2.5	14.1	7.9
Pneumonia (J13-J15 and J18.1)	0.9	1.0	2.1	3.1
Asthma (J45 and J46)	0.8	0.7	1.9	2.2
IV. Endocrine, nutritional and metabolic	6.3	5.5	14.9	17.3
Diabetes mellitus (E10-E14)	4.1	3.7	9.8	11.7
Nutritional deficiencies (E40-E46, E50-E64)	1.9	1.6	4.5	4.9
Anemia (D50)	0.1	0.2	0.3	0.6
Other HACSC	4.7	4.9	11.2	15.5
Total of HACSC	42.1	31.7	100.0	100.0
Total number of HACSC	49,316	30,871		

Source: Hospital Information System of the SUS (SIH/SUS).

HACSC: Hospitalization of older adults due to ambulatory care sensitive conditions



Source: Hospital Information System of the SUS (SIH/SUS).
 HACSC: Hospitalization of older adults due to ambulatory care sensitive conditions

Figure 1. Rate of hospitalization due to ambulatory care sensitive conditions among older adults according to sex and age group. Rio de Janeiro, Southeastern Brazil, 2000-2010.

Table 1 presents the main causes of HACSC for the years 2000 and 2010. It is possible to observe that the HACSC concentrated on three chapters of the ICD-10: diseases of the circulatory system, of the respiratory system, and endocrine, nutritional and metabolic diseases, which correspond to more than 80.0% of the total of HACSC in the two years that were studied. Hospitalizations due to chronic diseases were responsible for more than half of the HACSC, and six were the main causes: heart failure, cerebrovascular diseases, pulmonary diseases, diabetes mellitus, hypertension and angina. Together, these six causes represented 70.0% of all the HACSC in 2010. Moreover, the structure by causes remained almost unchanged in the period. It is possible to notice that there was a reduction in all the causes, but with different intensities.

Diseases of the circulatory system are the main causes of HACSC. They concentrated 21.3% of the total number of hospitalizations of older adults in 2000, which corresponded to 50.6% of the HACSC in that year. In 2010, the proportion of HACSC of older adults due to these causes was reduced to 15.5%, which corresponded to 49.0% of all the HACSC (Table 1).

Among the diseases of the circulatory system that are considered sensitive to ambulatory care, heart failure was the most frequent in the two years that were studied. However, there was a reduction both in the total number of hospitalizations and in those considered HACSC. Cerebrovascular diseases ranked second, with 17.6% of all the HACSC in 2010, followed by angina and hypertension (Table 1).

Table 2. Rate of hospitalization of older adults due to ambulatory care sensitive conditions and sex ratio of the hospitalization rates. Rio de Janeiro, Southeastern Brazil, 2000 and 2010.

ICD-10 - Chapter and cause	HACSC Rates per 1,000 inhabitants						Sex ratio	
	2000			2010			2000	2010
	Men	Women	Total	Men	Women	Total		
IX. Circulatory system	26.4	17.8	21.5	12.8	7.9	10.0	1.5	1.6
Heart failure (I50)	14.6	9.6	11.8	6.1	3.8	4.8	1.5	1.6
Cerebrovascular diseases (I63-I69, G45 and G46)	9.0	5.7	7.1	4.7	2.7	3.6	1.6	1.7
Angina (I20)	2.2	1.4	1.8	1.9	1.0	1.4	1.5	1.8
Hypertension (I10-I15)	3.5	3.0	3.2	1.4	1.2	1.3	1.1	1.2
X. Respiratory system	10.6	5.5	7.7	3.7	2.0	2.7	1.9	1.8
Chronic obstructive pulmonary diseases (J20-J21, J40-J44 and J47)	8.5	4.1	6.0	2.3	1.1	1.6	2.1	2.1
Pneumonia (J13-J15 and J18.1)	1.1	0.7	0.9	0.8	0.5	0.6	1.6	1.5
Asthma (J45 and J46)	0.9	0.7	0.8	0.5	0.4	0.5	1.3	1.3
IV. Endocrine, nutritional and metabolic	6.8	5.9	6.3	4.3	3.0	3.6	1.2	1.4
Diabetes mellitus (E10-E14)	3.8	4.4	4.2	2.6	2.2	2.4	0.9	1.2
Nutritional deficiencies (E40-E46, E50-E64)	2.7	1.3	1.9	1.5	0.6	1.0	2.1	2.4
Anemia (D50)	0.1	0.1	0.1	0.1	0.1	0.1	1.3	1.4
Other HACSC	6.0	3.8	4.7	3.9	2.6	3.2	1.6	1.5
Total of HACSC	52.4	34.9	42.7	25.9	16.3	25.0	1.5	1.6

Source: Hospital Information System of the SUS (SIH/SUS).

HACSC: Hospitalization of older adults due to ambulatory care sensitive conditions

The HACSC rates whose main cause were diseases of the circulatory system were the highest ones: 21.5/1,000 in 2000 and 10/1,000 in 2010, which shows a reduction of more than 50.0% in the risk of hospitalization due to these causes (Table 2).

The diseases of the respiratory system considered sensitive to ambulatory care in 2000 corresponded to 7.6% of the total number of hospitalizations of older adults. This represented 18.1% of the HACSC in that year, with an expressive reduction in 2010 (Table 1). The rate of hospitalization due to diseases of the respiratory system that are considered preventable decreased significantly between 2000 and 2010 (Table 2).

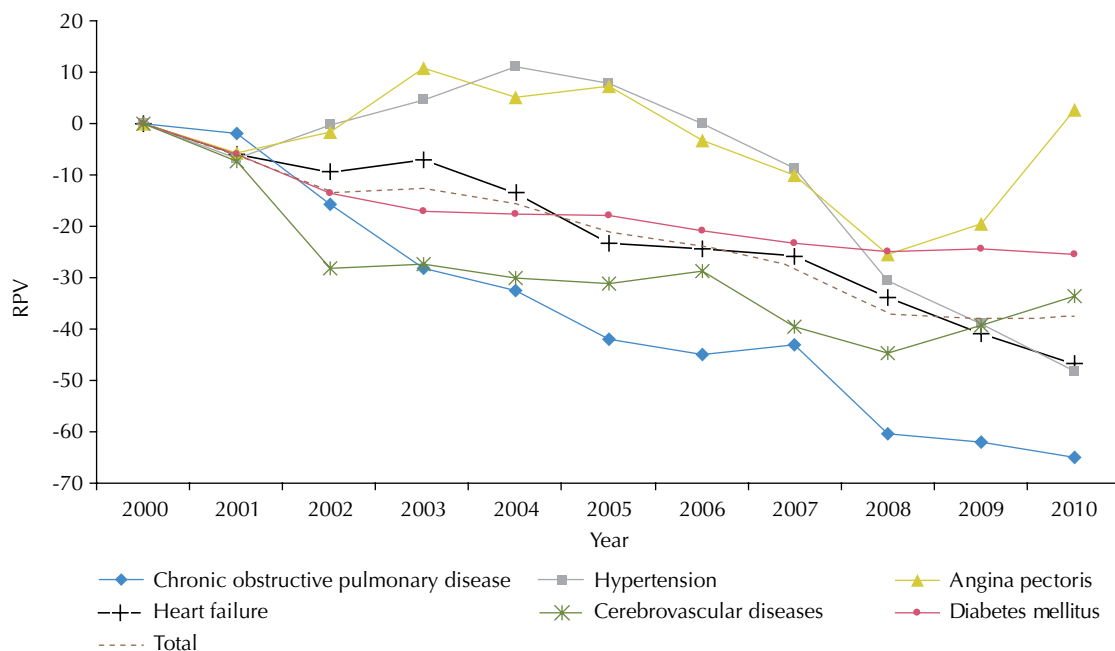
In the chapter of causes of the respiratory system (ICD-10), chronic obstructive pulmonary diseases concentrated the highest proportion of HACSC (Table 1). The rate of hospitalization due to chronic obstructive pulmonary diseases that is considered preventable also decreased significantly in the above-mentioned period (Table 2).

The third chapter that most concentrated HACSC was the one related to endocrine, nutritional and metabolic diseases (ICD-10). Among them, diabetes mellitus presented the highest proportion in the total of HACSC: it increased from 9.8% in 2000 to 11.7% in 2010. Asthma and pneumonia represent, each, approximately 2.0% of the total of HACSC (Table 1). Like in

the other causes, the hospitalization rates due to endocrine diseases decreased by almost 50.0% between 2000 and 2010 (Table 2).

The sex ratio of the HACSC rates indicated higher risk of HACSC among older men than among older women, both in 2000 and in 2010. Chronic obstructive pulmonary diseases and nutritional deficiencies were the hospitalization causes of highest risk among men. Except for diabetes, in all the other compared causes of HACSC, the risk of hospitalization was higher for men (Table 2).

Figure 2 presents the annual relative percentage variation of the HACSC rates of the six main causes in the period that ranges from 2000 to 2010, based on the year 2000. It is possible to observe that, in this decade, except for angina, all the causes reduced the HACSC rates, although with different intensities. Chronic obstructive pulmonary diseases presented the highest and most regular reduction in the period (they decreased by 73.0% between 2000 and 2010). Among the diseases of the circulatory system, heart failure and cerebrovascular diseases presented a regular and intense reduction since the year 2000 – the former decreased by 59.0% and the latter by 48.7% in 2010. Hypertension also presented an important reduction (60.0%), but increased slightly between 2003 and 2005. Diabetes mellitus had a regular reduction: its rate was 42.5% lower in 2010 compared to 2000. Angina presented the lowest reduction (20.8%), with intense variability.



Source: Hospital Information System of the SUS (SIH/SUS).
RPV: Relative percentage variation

Figure 2. Relative percentage variation of the rates of hospitalization due to ambulatory care sensitive conditions, total and six main causes. Rio de Janeiro, Southeastern Brazil, 2000-2010.

Figure 3 shows the increase in the older adults' access to primary care in Rio de Janeiro. ESF coverage increased from 3.6% in 2000 to 23.6% in 2010. The number of medical consultations of older adults in the ESF also increased, although irregularly in the period (from 90 to 420 per 1,000 inhabitants between 2000 and 2010).

The correlation analysis between the access indicators and the HACSC rates showed a negative correlation. Pearson's correlation coefficient of the HACSC rates for ESF coverage was -0.95 and, for the number of consultations of older adults in the ESF, -0.66. This shows that, the larger the ESF coverage and/or the higher the number of consultations of older adults in primary care, the lower the number of HACSC.

DISCUSSION

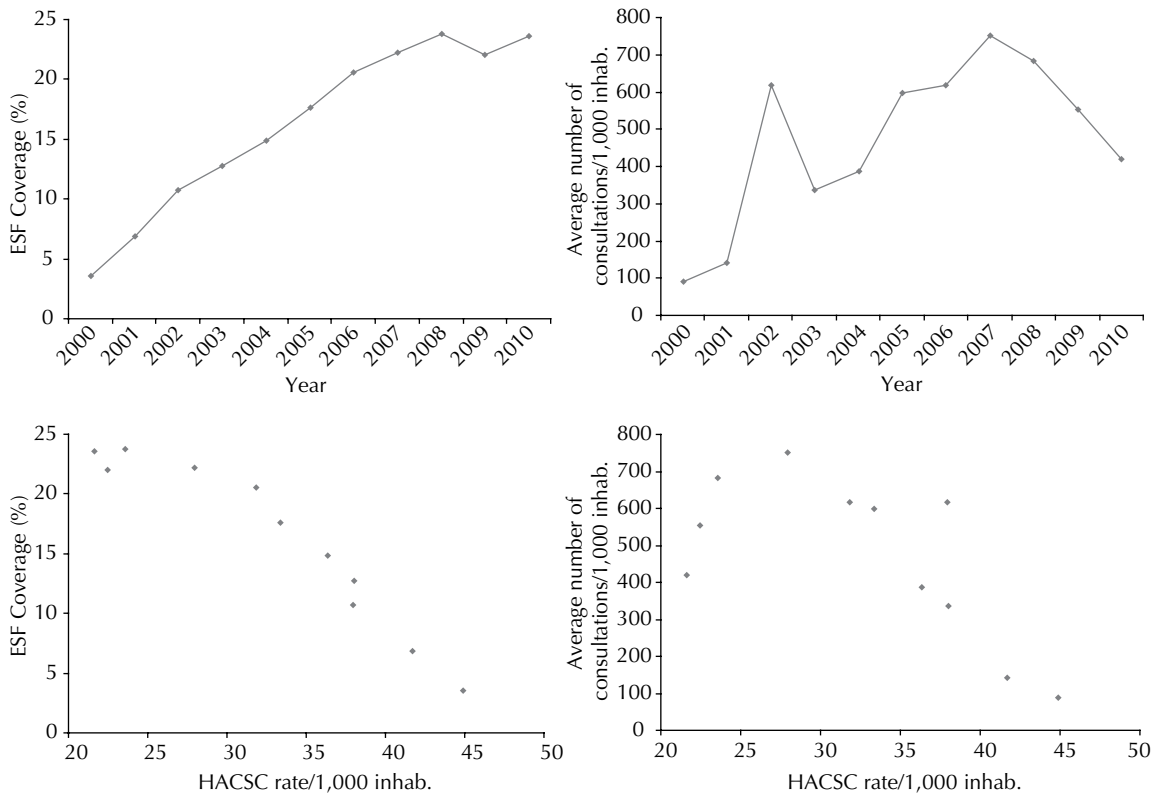
The trend of reduction in the HACSC observed in this research is consistent with other studies, both in other countries and in other regions of Brazil.^{8,12,g} In a study about the age profile of the HACSC that occurred in the state of Minas Gerais, Southeastern Brazil,^g between 1998 and 2004, the trend of reduction in the HACSC rates for the older population was also observed. Studies

carried out in districts of Spain showed that, between 1996 and 1999, the HACSC rates for older adults aged between 60 and 74 years were around 26/1,000 inhabitants,^{8,12} a level that Rio de Janeiro reached ten years later.

Chronic diseases represent more than half of the HACSC of older adults in the state of Rio de Janeiro, in all the years of the study. The majority of the HACSC were due to diseases of the respiratory and of the circulatory systems, more specifically, chronic obstructive pulmonary diseases and heart failure. These findings corroborate the international literature, which points that such diseases are mainly responsible for the HACSC of older adults.^{8,14}

Heart failure, one of the most severe consequences of the aging of the circulatory system, is the cause of older adults' more frequent hospitalization and high mortality.²⁶ Research has shown that blood pressure control, which can and must be performed in home care, would prevent the emergence of heart failure and, in cases in which the disease is already present, complications would be avoided.^{1,26} These studies strengthen the relevance of primary care to increased survival and especially to active and healthy aging.

^g Perpetuo IHO, Wong LR. Atenção hospitalar por condições sensíveis à atenção ambulatorial (CSAA) e as mudanças do seu padrão etário: uma análise exploratória dos dados de Minas Gerais. Anais do XII Seminário sobre a Economia Mineira. 2006. Uberlândia (MG): Universidade Federal de Uberlândia. Uberlândia; 2006.



Source: Primary Care Information System (SIAB) and Hospital Information System of the SUS (SIH/SUS).

HACSC: Hospitalization of older adults due to ambulatory care sensitive conditions; ESP: Family Health Strategy

Figure 3. Coverage of the Family Health Strategy, average number of consultations attended by older adults in primary care and correlation with the rates of hospitalization due to ambulatory care sensitive conditions. Rio de Janeiro, Southeastern Brazil, 2000-2010.

Chronic obstructive pulmonary diseases were the HACSC causes that presented the greatest inequality between sexes. Men's risk of hospitalization was twice as high as that of women's. Studies have shown that smoking is more frequent among men and is one of the main risk factors for the emergence of chronic obstructive pulmonary diseases or for their aggravation.^{16,22}

Although, in the long run, the benefits of the interruption of the habit of smoking are higher among young individuals, smoking cessation reduces the risk of morbidity and mortality in any age group. In fact, studies have shown that smoking cessation among older adults reduces the risk of death and increases the survival of ex-smokers by up to 20.0%.^{13,24} In 2004, the Ministry of Health implemented the National Program for Tobacco Control^h aiming to promote the fight against tobacco use, in order to reduce the prevalence of smokers in Brazil and the consequent morbidity and mortality caused by tobacco-related diseases. The actions guided by this Program may have contributed

to the reduction in the HACSC among older adults in the previous decade, mainly those caused by chronic obstructive pulmonary diseases.

The higher prevalence of HACSC among older adults with more advanced age agrees with the literature.^{9,8} The increase in the presence of comorbidities as time passes by is one of the explanations for these findings.⁹ However, the results of the present study concerning the higher intensity of the reduction in the HASCS in this group of more advanced age, when compared to those who are "younger", suggest that primary care must intensify the actions to promote healthcare in the older adults' homes to all ages, and monitor the symptoms of fragility on a regular basis, in order to avoid complications that may lead to the risks that any hospitalization implies.

In this study, men presented a higher risk of HACSC. The higher risk of hospitalizations of older men was also observed in a study carried out in the state of Rio de Janeiro,¹⁹ which showed that men's risk of extending

^h Ministério da Saúde. Secretaria de Atenção à Saúde. Portaria nº 442, de 13 de agosto de 2004 Plano para implantação da abordagem e tratamento do tabagismo no SUS e o protocolo clínico e diretrizes terapêuticas - dependência à nicotina. *Diário Oficial Uniao*. 15 Ago 2004;Seção1:62.

the hospitalization period was approximately twice as high when compared to women's, not because of clinical needs, but because of the need of care that could be provided at home.

The gender difference might be explained by behavioral attitudes related to habits and lifestyle, as well as by healthcare patterns – men expose themselves to greater health risks throughout life and attend less the prevention and health promotion services compared to women.¹⁷ Another hypothesis to explain the gender difference regarding the chance of hospitalizations is that, although men have a family typology that is traditionally nuclear, and in many cases, in expansion, they are less backed by social support networks and by the extended family, especially in terms of daily care in basic activities.¹⁸

The negative correlation that was observed between the indicators of the older adults' access to primary care and the reduction in the HACSC, which is stronger with the ESF coverage, is consistent with the national and international literature, which show that primary care programs are important inductors of reductions in the HACSC.^{8,g}

One of the limitations of this study is the established age limit: 74 years. There is no consensus regarding up to what

age hospitalizations can be avoided, and the age groups found in the international literature vary.^{8,10} The decision to use the age of 74 as the limit is supported by the study conducted by Jackson & Tobias,⁹ in view of data about the high prevalence of comorbidities in ages above 74 years.

Other limitations are inherent in the fact of analyzing data provided by the SIH/SUS,⁵ due to the comprehensiveness of its information. One of them is the system's coverage. It records only the hospitalizations paid by the SUS; therefore, there is no information about admissions to private hospitals paid by other sources. However, in Rio de Janeiro, data from the last *Pesquisa Nacional por Amostra de Domicílios* (PNAD – National Survey by Domicile Sampling) have shown that the majority of older adults use the SUS for hospitalizations (63,3%).^f

We conclude that the advance in the reorganization of primary care in Rio de Janeiro has brought significant impacts on the hospital morbidity of the residing older population. The HACSC proved to be an important management instrument, as it identifies the main causes that are sensitive to the intervention of the healthcare services, and signal which actions are more effective to reduce hospitalizations, thus contributing to increase the older adults' quality of life.

REFERENCES

- Barretto ACP. Hipertensão arterial e insuficiência cardíaca. *Rev Bras Hipertens*. 2001;8(3):339-43.
- Billings J, Zeitel L, Lukomnik J, Carey TS, Blank AE, Newman L. Impact of socioeconomic status on hospital use in New York City. *Health Aff (Millwood)*. 1993;12(1):162-73. DOI: 10.1377/hlthaff.12.1.162.
- Bindman AB, Grumbach K, Osmond D, Komaromy M, Vranizan K, Lurie N, et al. Preventable hospitalizations and access to health care. *JAMA*. 1995;274(4):305-11. DOI: 0.1001/jama.1995.03530040033037.
- Caldeira AP, Fernandes VBL, Fonseca WP, Faria AA. Internações pediátricas por condições sensíveis à atenção primária em Montes Claros, Minas Gerais, Brasil. *Rev Bras Saude Mater Infant*. 2011;11(1):61-71. DOI:10.1590/S1519-38292011000100007
- Carvalho D. Grandes sistemas nacionais de informação em saúde: revisão e discussão da situação atual. *Inf Epidemiol SUS*. 1997;6(4):7-46.
- Friedman B, Basu J. Health insurance, primary care, and preventable hospitalization of children in a large state. *Am J Manag Care*. 2001;7(5):473-81.
- Gill TM, Allore HG, Holford TR, Guo Z. Hospitalization, restricted activity, and the development of disability among older persons. *JAMA*. 2004;292(17):2115-24. DOI:10.1001/jama.292.17.2115
- Homar JC, Starfield B, Ruiz ES, Pérez EH, Mateo MM. La Atención Primaria de Salud y las hospitalizaciones por Ambulatory Care Sensitive Conditions en Cataluña. *Rev Clin Esp*. 2001;201(9):501-07. DOI:10.1016/S0014-2565(01)70896-X
- Jackson G, Tobias M. Potentially avoidable hospitalisations in New Zealand, 1989-98. *Aust N Z J Public Health*. 2001;25(3):212-21. DOI:10.1111/j.1467-842X.2001.tb00565.x
- López MIV, Morata JLG, Jiménez MM, López MMV, Cavanillas AB. Intervenciones sanitarias en atención primaria que disminuyen la hospitalización por Ambulatory Care Sensitive Conditions en mayores de 65 años. *Aten Primaria*. 2007;39(10):525-34. DOI:10.1157/131110730
- Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998. *Health Serv Res*. 2003;38(3):831-65. DOI:10.1111/1475-6773.00149
- Magan P, Otero A, Alberquilla A, Ribera JM. Geographic variations in avoidable hospitalizations in the elderly, in a health system with universal coverage. *BMC Health Serv Res*. 2008;8:42. DOI:10.1186/1472-6963-8-42
- Maxwell CJ, Hirdes J. The prevalence of smoking and implications for the quality of life among the community-based elderly. *Am J Prev Med*. 1993;9(6):338-45
- Niti M, Ng TP. Avoidable hospitalisation rates in Singapore, 1991-1998: assessing trends and inequities of quality in primary care. *J Epidemiol Community Health*. 2003;57(1):17-22. DOI:10.1136/jech.57.1.17
- Nunes A. O envelhecimento populacional e as despesas do Sistema Único de Saúde. In: Camarano AA, organizadora. Os novos idosos brasileiros: muito além dos 60? Rio de Janeiro: Ipea; 2004. p. 427-50.

16. Pamplona P, Mendes B. Estratégia de tratamento do tabagismo na DPOC. *Rev Port Pneumol.* 2009;15(6):1121-56. DOI:10.1016/S2173-5115(09)70171-X
17. Pinheiro RS, Viacava F, Travassos C, Brito AS. Gênero, morbidade, acesso e utilização de serviços de saúde no Brasil. *Cienc Saude Coletiva.* 2002;7(4):687-707. DOI:10.1590/S1413-81232002000400007
18. Romero DE. Diferenciais de gênero no impacto do arranjo familiar no status de saúde dos idosos brasileiros. *Cienc Saude Coletiva.* 2002;7(4):777-94. DOI:10.1590/S1413-81232002000400013
19. Romero DE, Marques A, Barbosa AC, Sabino R. Internações de idosos por cuidados prolongados em hospitais do SUS no Rio de Janeiro: uma análise de suas características e da fragilidade das redes sociais de cuidado. In: Camarano AA, organizadora. *Cuidados de longa duração para população idosa: um novo risco social a ser assumido?* Rio de Janeiro: Ipea; 2010. v.1, p. 249-78.
20. Sager MA, Franke T, Inouye SK, Landefeld CS, Morgan TM, Rudberg MA, et al. Functional outcomes of acute medical illness and hospitalization in older persons. *Arch Intern Med.* 1996;156(6):645-52. DOI:10.1001/archinte.1996.00440060067008
21. Scorel S, Giovannella L, Mendonça MHM, Senna MCM. O Programa de Saúde da Família e a construção de um novo modelo para a atenção básica no Brasil. *Rev Panam Salud Publica.* 2007;21(2):164-76. DOI:10.1590/S1020-49892007000200011
22. Soares S, Costa I, Neves AL, Couto L. Caracterização de uma população com risco acrescido de DPOC. *Rev Port Pneumol.* 2010;16(2):237-252. DOI:10.1016/S2173-5115(10)70033-6
23. Starfield B, Shi L. Policy relevant determinants of health: an international perspective. *Health Policy.* 2002;60(3):201-18. DOI:10.1016/S0168-8510(01)00208-1
24. Vollset SE, Tverdal A, Gjessing HK. Smoking and deaths between 40 and 70 years of age in women and men. *Ann Intern Med.* 2006;144(3):13-7.
25. Wilson RS, Hebert LE, Scherr PA, Dong X, Leurgens SE, Evans DA. Cognitive decline after hospitalization in a community population of older persons. *Neurology.* 2012;78(13):950-56. DOI:10.1212/WNL.0b013e31824d5894
26. Zaslavsky C, Gus I. Idoso: doença cardíaca e comorbidades. *Arq Bras Cardiol.* 2002;79(6):635-39. DOI:10.1590/S0066-782X2002001500011

Article based on the master's dissertation of Marques AP, titled: "Análise das causas de internação de idosos segundo a classificação de Condições Sensíveis à Atenção Primária: estudo da evolução temporal no estado do Rio de Janeiro", submitted to the *Programa de Pós-Graduação em Saúde Pública* of the *Escola Nacional de Saúde Pública Sergio Arouca*, in 2012. Research supported by the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq – Process 407828/2012-5 of 2012).

This article is an extended version of the study published in the *Procedures of the XVIII Encontro da Associação Brasileira de Estudos Populacionais*, in 2012.

The authors declare no conflict of interest.

HIGHLIGHTS

This study aimed to assess the impact of primary care on the reduction in the hospitalizations of older adults due to ambulatory care sensitive conditions (HACSC).

In Brazil, where primary care has a strategic role in the health system and the population's aging has been advancing in an accelerated way, assessing the quality of the provided services and their impact on older adults' health status is essential for planning of public policies.

The authors found an intense reduction in the HACSC of older adults for all causes and age groups. Heart failure, cerebrovascular diseases and chronic obstructive pulmonary diseases cause 50.0% of such hospitalizations. Adults older than 69 years have a higher risk of being hospitalized due to one of these causes. Being male presented a higher hospitalization risk. The high negative correlation between HACSC and access to primary care indicates the robustness of the HACSC indicator to the analysis of the performance of the Brazilian Unified Health System (SUS).

Identifying the main causes of the hospitalization of older adults allows that primary care acts in the prevention of such problems in order to avoid unnecessary hospitalizations, thus improving this population's quality of life and reducing costs in the SUS.

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Scientific Editor