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Hospitalizations for ambulatory care-sensitive conditions, Minas Gerais, Southeastern Brazil, 2000 and 2010

Internações por condições sensíveis à atenção primária, Minas Gerais, 2000 e 2010

ABSTRACT

OBJECTIVE: To analyze hospitalization rates and the proportion of deaths due to ambulatory care-sensitive hospitalizations and to characterize them according to coverage by the Family Health Strategy, a primary health care guidance program.

METHODS: An ecological study comprising 853 municipalities in the state of Minas Gerais, under the purview of 28 regional health care units, was conducted. We used data from the Hospital Information System of the Brazilian Unified Health System. Ambulatory care-sensitive hospitalizations in 2000 and 2010 were compared. Population data were obtained from the demographic censuses.

RESULTS: The number of ambulatory care-sensitive hospitalizations declined from 20.75/1,000 inhabitants [standard deviation (SD) = 10.42) in 2000 to 14.92/thousand inhabitants (SD = 10.04) in 2010 Heart failure was the most frequent cause in both years. Hospitalizations rates for hypertension, asthma, and diabetes mellitus, decreased, whereas those for angina pectoris, prenatal and birth disorders, kidney and urinary tract infections, and other acute infections increased. Hospitalization durations and the proportion of deaths due to ambulatory care-sensitive hospitalizations increased significantly.

CONCLUSIONS: Mean hospitalization rates for sensitive conditions were significantly lower in 2010 than in 2000, but no correlation was found with regard to the expansion of the population coverage of the Family Health Strategy. Hospitalization rates and proportion of deaths were different between the various health care regions in the years evaluated, indicating a need to prioritize the primary health care with high efficiency and quality.

DESCRIPTORS: Hospitalization. Length of Stay, trends. Ambulatory Care. Primary Health Care. Family Health Strategy. Hospital Information Systems. Ecological Studies. Health Services Evaluation. Primary Health Care. Hospitalization. Primary Health Care.

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RESUMO

OBJETIVO: Analisar taxas de permanência hospitalar e de proporção de óbitos por internações por condições sensíveis à atenção primária em saúde, caracterizando-as segundo cobertura pela Estratégia de Saúde da Família.

MÉTODOS: Trata-se de estudo ecológico que teve como unidade de análise os 853 municípios do estado de Minas Gerais, estratificados pelas 28 regionais de saúde. Foram utilizados dados do Sistema de Informação Hospitalar do Sistema Único de Saúde. As internações por condições sensíveis de 2000 foram comparadas às de 2010. Dados populacionais foram obtidos dos censos demográficos.

RESULTADOS: As internações por condições sensíveis à atenção primária apresentaram queda de 20,75/mil hab (DP = 10,42) em 2000 para 14,92/mil hab (DP = 10,04) em 2010. A insuficiência cardíaca foi a causa mais frequente em ambos os períodos. Houve redução nas taxas de internações por hipertensão arterial, asma e diabetes *mellitus*, bem como aumento nas internações por angina pectoris, doenças relacionadas ao pré-natal e parto, infecções de rim e trato urinário, além de outras infecções agudas. A permanência hospitalar e a proporção de óbitos por internações por condições sensíveis aumentaram significativamente.

CONCLUSÕES: A taxa média de internações por condições sensíveis foi significativamente menor em 2010 do que em 2000, mas não foi observada correlação com a expansão de cobertura populacional da Estratégia de Saúde da Família. As taxas de permanência hospitalar e proporção de óbitos entre os anos avaliados comportaram-se de forma distinta entre as diversas regionais de saúde, apontando necessidade de priorização de atenção primária resolutiva e de qualidade.

DESCRITORES: Hospitalização. Tempo de Internação, tendências. Assistência Ambulatorial. Atenção Primária à Saúde. Estratégia Saúde da Família. Sistemas de Informação Hospitalar. Estudos Ecológicos.

INTRODUCTION

The concept of ambulatory care-sensitive hospitalizations originated in the United States in the early 1990s with the introduction of the indicators "ambulatory care-sensitive conditions" and "avoidable hospitalizations".[6] Thereafter, this concept was also adopted in Canada and European countries as a tool to evaluate the care offered to populations with a low socioeconomic status, as a marker of primary health care quality and for evaluating the access to health services.[2,5,7] Highly prevalent pathologies, which have considerable impact on morbimortality and can be treated at primary and ambulatory health care services, have been considered the subject of prioritized intervention at the primary health care level and are also considered pertinent to the concept of sensitive conditions at this level.[1]

With this perspective, greater resolution capacity of primary health care services should lead to a reduction in hospital admissions. This expectation has led to an increasing responsibility of primary health care services as one of the most effective health care alternatives with the most reasonable cost. This helps increase the importance of this level of care in the health system, which remains considerably polarized by hospital care.

This is the basis of the proposals for evaluating the functioning of primary health care based on hospitalizations for preventable causes through appropriate intervention, in terms of type, location, intensity, and opportunity for each health problem, at the primary health care level.[10]

In Brazil, the first lists of ambulatory care-sensitive conditions were reported in the literature, starting in 2001 in the states of Ceará,[a] Minas Gerais,[b] and in the municipality of Curitiba, in the state of Paraná.[c] Along

[a] Secretaria de Estado da Saúde do Ceará. Lista de diagnósticos sensíveis à atenção ambulatorial da Secretaria de Estado da Saúde do Ceará. Fortaleza; 2001.

[b] Secretaria de Estado da Saúde de Minas Gerais. Resolução SES/MG Nº 1093, de 29 de dezembro de 2006. Belo Horizonte; 2006 [cited 2014 Ago 16]. Available from: http://www.saude.mg.gov.br/sobre/institucional/resolucoes

[c] Secretaria Municipal de Saúde de Curitiba, Centro de Epidemiologia, Coordenação de Diagnóstico em Saúde. Avaliação das internações por condições sensíveis à atenção ambulatorial. Curitiba (PR); 2006.

with international experiences, these lists provided support for the preparation of the indicator of ambulatory care-sensitive hospitalizations (ACSH).[1]

The increase in scientific articles in recent years shows growing interest in the use of ACSH indicators worldwide, but with distinct names and differences between the lists of conditions. Most studies acknowledge that the appropriate supply of primary health care services decreases ACSH, although the magnitude of this relationship varies according to the sociodemographic conditions and the current health policies.[16]

In this regard, ACSH can potentially be used to evaluate the impact of actions of the Family Health Strategy (FHS), a primary health care guidance program within the sphere of Brazilian Unified Health System (SUS).

Within the context of FHS, evaluation of the effectiveness involves considering the various elements that constitute this strategy, which are influenced not only by the social, economic, political, cultural, and biological contexts but also by the proposal for a differentiated work process involving new skills. FHS requires teams to focus more on patient care aspects for health surveillance activities. This requires changes in how individual and collective approaches are undertaken as well as an integrated performance from the various sectors of municipal public administration.[d]

The goal of this study was to analyze the rates of hospitalization and the proportion of deaths following ACSH, characterizing them according to the coverage of FHS.

METHODS

This is an ecological study[e] carried out in the state of Minas Gerais, Southeastern Brazil, involving 853 municipalities that were under the purview of 28 regional health care units. The population of the state of Minas Gerais was 19,597,330 inhabitants in 2010.[f] We chose to perform stratification-based analyses because the municipalities of Minas Gerais have a wide range of socioeconomic conditions, including those in the environmental and behavioral contexts, as well as significant heterogeneity in the FHS expansion process. These regional units are political and administrative reference centers of the Health Department of Minas Gerais State (SES-MG) that exist alongside the healthcare regionalization proposed by the Master Plan for the Regionalization of Minas Gerais.[g]

Data on hospital admissions were selected by place of residence, in the years of 2000 and 2010, and obtained from the Hospital Information System (SIH-SUS), which is based on Authorizations of Hospital Admissions (AHA).[h]

ACSH were identified using the keywords of the Brazilian list proposed by the Ministry of Health,[5] according to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (CID-10). An algorithm designed by the investigators was employed using the Stata program.

Rates were calculated using the number of ACSH per 1,000 inhabitants, using the population data from the 2000 and 2010 censuses.[f] A descriptive analysis was initially performed using rate ratios (RTx 2010/2000) of ACSH for the state, considering the groups of causes that led to hospitalization. The development of ACSH rates at the Regional Health Units/SES-MG was also analyzed. The significance of the difference between the years 2000 and 2010 was verified using the paired *t*-test.

Then, ACSH rates were compared between the regional health units in the years 2000 and 2010. Analysis of variance was used for the significance analysis, followed by Dunnett's post hoc test.

The proportion of deaths due to ACSH between the two years (R% 2010/2000) and the proportion between hospitalization durations, in days (RPerm 2010/2000), were analyzed for each regional health unit. The statistical significance was also determined by applying the paired *t*-test.

The significances of the differences between the mean proportions of deaths due to ACSH during the two years (R% 2010/2000) and of the mean durations of hospitalization (RPerm 2010/2000) were obtained by applying the paired *t*-test.

Data from the Primary Care Information System (SIAB) were gathered to calculate the population coverage by FHS, using the following formula: (number of people registered in SIAB/total population) × 100, with a limiter of 100% for coverage. The difference in FHS coverage at the regional health units was calculated between the two years (Diff. FHS 2010-2000).

The correlation between the difference in FHS coverage (Diff. FHS 2010-2000) and the ACSH rate ratio was ascertained using Pearson's correlation coefficient.

[d] Starfield B. Atenção primária: equilíbrio entre necessidades de saúde, serviços e tecnologia. Brasília (DF): UNESCO/Ministério da Saúde; 2002.
[e] Research conducted by the Center of Advisory, Training and Studies in Health of the Federal University of Juiz de Fora, MG, Southeastern Brazil, in 2002, titled "Integrated use of the database in health evaluation".
[f] Ministério da Saúde, Departamento de Informática do Sistema Único de Saúde – DATASUS. População residente: Minas Gerais [cited 2014 Ago 20]. Available from: http://tabnet.datasus.gov.br/cgi/deftohtm.exe?ibge/cnv/popmg.def
[g] Secretaria de Estado de Saúde de Minas Gerais. O PDR: Plano Diretor de Regionalização da Saúde de Minas Gerais. Belo Horizonte; 2010 [cited 2013 Feb 28]. Available from: http://www.saude.mg.gov.br/politicas_de_saude/plano-diretor-de-regionalizacao-pdr-novo/PDR.pdf
[h] Ministério da Saúde, Departamento de Informática do Sistema Único de Saúde – DATASUS [homepage]. Brasília (DF): s.d. [cited 2014 Ago 16]. Available from: http://www2.datasus.gov.br/DATASUS/index.php

Table 1. Hospitalization rates for ambulatory care-sensitive conditions according to cause (per 1,000 inhabitants). Minas Gerais, Southeastern Brazil, 2000 and 2010.

Variable	Rate 2000	Class	Rate 2010	Class	RTx
Heart failure	3.52	1	2.01	1	0.57
Gastroenteritis	2.40	2	1.37	2	0.57
Kidney and urinary tract infections	0.97	7	1.30	3	1.34
Cerebrovascular diseases	1.70	4	1.17	4	0.69
Bacterial pneumonia	1.23	6	1.16	5	0.94
Pulmonary diseases	2.03	3	1.04	6	0.51
Angina pectoris	0.53	11	0.88	7	1.66
Diabetes mellitus	0.85	9	0.80	8	0.94
Asthma	1.57	5	0.68	9	0.43
Malnutrition	0.51	12	0.50	10	0.98
Skin infections	0.37	14	0.38	11	1.03
Hypertension	0.86	8	0.37	12	0.43
Epilepsy	0.35	15	0.30	13	0.86
Gastrointestinal ulceration	0.84	10	0.22	14	0.26
Inflammatory disease of the female pelvic organs	0.51	13	0.18	15	0.35
Ear, nose, and throat infections	0.06	19	0.10	16	1.67
Prenatal and birth disorders	0.06	17	0.10	17	1.67
Iron-deficiency anemia	0.14	16	0.08	18	0.57
Tuberculosis	0.06	18	0.07	19	1.17
Rheumatic fever	0.03	20	0.02	20	0.67
Vaccine-preventable diseases	0.01	21	0.01	21	1.00
Others	0.01	22	0.00	22	0.00

Source: Hospital Information System of the Brazilian Unified Health System (SIH-SUS).
Rtx: Rate ratio 2010/2000; Class: Classification in decreasing order of rates in the years studied

Version 15.0 of the SPSS program was used for the analyses of statistical significance and correlation.

RESULTS

The population of Minas Gerais increased by 9.5% between 2000 and 2010, totaling 19,597,330 inhabitants, according to the 2010 census. The total number of hospitalizations decreased from 1,256,761 to 1,149,253 in the same period (8.5%). ACSH rates in the state decreased significantly, from 20.75/1,000 inhabitants [standard deviation (SD) = 10.42] in 2000 to 14.92/1,000 inhabitants (SD = 10.04) in 2010 ($p < 0.001$).

The 10 most frequent causes of hospitalizations corresponded to 86.0% of the total ACSH in both years. Heart failure and gastroenteritis were recorded with higher rates in both the years. Rates for some other causes increased during the period evaluated; e.g., angina pectoris (RTx = 1.7); prenatal and birth disorders (RTx = 1.6); nose, ear, and throat infections (RTx = 1.9); kidney and urinary tract infections (RTx = 1.34); and tuberculosis (RTx = 1.2). Hospitalizations for malnutrition, diabetes mellitus, skin infections, and bacterial pneumonia either remained stable or showed no significant differences. The rates of other causes of ACSH, in particular asthma, inflammatory diseases of the female pelvic organs, and hypertension, decreased with rate ratios below 0.5 (Table 1).

As observed in the overall analysis of the state, the decrease in ACSH rates between the two years was significant in 22 of the 28 regional health units. The difference observed from 2000 to 2010 in each regional unit varied considerably, showing the greatest decrease (10.25/1,000 inhabitants) at the regional health unit of Ituiutaba and the greatest increase (1.05/1,000 inhabitants) at the regional unit of Juiz de Fora. Data from other regional units are shown in Table 2.

In 2000, the regional health unit with the highest mean ACSH rate was Leopoldina (33.06/1,000 inhabitants), with a significant difference between the regional units of Januária ($p = 0.029$) and Montes Claros ($p = 0.017$). The regional unit of Ubá was identified with a significant difference in comparison with those of Belo Horizonte ($p = 0.017$), Januária ($p = 0.007$), and Montes Claros (0.001) (Table 2).

Table 2. Rates of hospitalizations for ambulatory care-sensitive conditions per 1,000 inhabitants at the regional health units. Minas Gerais, Southeastern Brazil, 2000 and 2010.

Variable	2000		2010		RTx	p
	Mean rate	SD	Mean rate	SD		
Regional health unit	20.75	10.42	14.92	10.04	0.72	0.000
Sete Lagoas	17.98	8.64	8.96[a]	7.00	0.50	0.000
Belo Horizonte	14.97[a]	6.11	8.53[a,b]	4.20	0.57	0.000
Coronel Fabriciano	19.08	8.14	11.04[a]	4.40	0.58	0.000
Ituiutaba	24.3	8.87	14.05	8.36	0.58	0.011
Itabira	22.45	10.09	13.4	8.03	0.60	0.000
Ponte Nova	21.98	11.27	13.24	7.01	0.60	0.000
Patos de Minas	17.72	10.94	10.84[a]	4.27	0.61	0.008
Divinópolis	21.14	8.97	13.27[a]	7.56	0.63	0.000
Pouso Alegre	19.25	9.16	12.11[a]	9.41	0.63	0.000
Uberlândia	18.51	11.18	11.66	4.94	0.63	0.001
Governador Valadares	27.12	10.84	17.73	12.46	0.65	0.000
Pirapora	19.08	9.14	12.4	8.43	0.65	0.000
Unaí	12.49	11.15	8.37[a,b]	12.89	0.67	0.083
Alfenas	18.78	8.39	13.09[a]	6.89	0.70	0.020
Manhumirim	22	9.19	15.34	7.83	0.70	0.000
Uberaba	23.55	15.98	16.47	17.19	0.70	0.027
Varginha	21.75	8.05	15.28	7.26	0.70	0.000
Leopoldina	33.06	12.59	23.88	8.26	0.72	0.000
Passos	21.05	9.65	15.14	8.86	0.72	0.002
Sao João Del Rei	24.67	8.60	18.91	6.65	0.77	0.003
Barbacena	21.55	8.95	16.94	8.89	0.79	0.026
Montes Claros	14.17[a,b]	6.50	11.13[a]	5.50	0.79	0.003
Teófilo Otoni	25.57	11.11	20.99	11.83	0.82	0.034
Ubá	30.69	10.34	26.73	10.75	0.87	0.067
Diamantina	21.52	9.14	18.88	9.28	0.88	0.069
Pedra Azul	21.23	9.87	20.79	13.74	0.98	0.841
Januária	12.64[a,b]	6.68	13.03[a,b]	9.50	1.03	0.776
Juiz de Fora	17.64	11.05	18.69[a]	13.84	1.06	0.553

Source: Hospital Information System of the Brazilian Unified Health System (SIH-SUS).
ACSH: Hospitalizations for ambulatory care-sensitive conditions; Rtx: Rate ratio 2010/2000
[a] Regional Health Units that had a significant difference in relation to RHU of Ubá.
[b] Regional Health Units that had a significant difference in relation to RHU of Leopoldina.

In 2010, the average rate of the regional unit of Ubá was significantly higher than the averages of the other regional units (Table 2). The second highest average ACSH rate, in the same year, was for the regional unit of Leopoldina (23.88/1,000 inhabitants), significantly higher than those found in other regional units (Table 2).

The proportion of deaths due to ACSH in the state increased from 4.8% to 6.5% ($p < 0.01$) in the period studied. The regional health units that had a significant increase in the average proportions of deaths were Coronel Fabriciano, Divinópolis, Governador Valadares, Itabira, Januária, Manhumirim, Montes Claros, Passos, Pouso Alegre, Sete Lagoas, Teófilo Otoni, and Varginha. Although not statistically significant, a decline was observed in the mean proportions of deaths at the regional units of Barbacena, Juiz de Fora, and Ubá (Table 3).

The average increase in duration of hospitalization for ACSH in the state between the two years of the study was small (5.0-5.2 days); however, the difference was statistically significant ($p = 0.004$). The average hospitalization duration for ACSH was significantly higher in 2010 than in 2000 (Table 3).

Regarding FHS coverage, on average, a significant increase was observed for all regional health units in the state. This increase ranged from 26.5% in Sete Lagoas to 74.8% in Governador Valadares. The only regional unit with a significant correlation between FHS expansion and the average ACSH rate ratio was Manhumirim (r = 0.369, p = 0.027), indicating that, for the municipalities of this regional unit, the greater the expansion of FHS, the lower the ACSH rate ratio. For the regional units of Pedra Azul, Januária, and Juiz de Fora, despite the increase in FHS coverage (49.1%, 52.4%, and 54.7% respectively), significant changes were not observed in ACSH. The regional unit of Sete Lagoas had lesser increase in FHS coverage (26.5%) and a greater decrease in ACSH rates (RTx = 0.5); however, these differences were not statistically significant (Table 4).

No significant correlations were found between hospitalization durations and increase in FHS coverage at the regional health units. This correlation was not significant in the overall analysis of the state as well (Pearson's coefficient = 0.039, p = 0.252).

DISCUSSION

The total number of hospitalizations for general causes in the state of Minas Gerais decreased from 1,256,761

Table 3. Proportion of deaths following hospitalization admission and hospitalization durations for ambulatory care-sensitive conditions at the regional health units. Minas Gerais, Southeastern Brazil, 2000 and 2010.

Variável	Proportion of deaths (%)				Hospitalization duration (days)			
	2000	2010	R%	p	2000	2010	RPerm	p
Regional health unit	4.8	6.5	1.4	0.000	5.0	5.2	1.0	0.004
Alfenas	4.9	6.8	1.4	0.051	4.5	4.8	1.1	0.407
Barbacena	6.0	5.4	0.9	0.460	5.5	6.2	1.1	0.008
Belo Horizonte	5.4	6.7	1.2	0.070	6.1	7.5	1.2	0.000
Coronel Fabriciano	6.2	8.6	1.4	0.003	5.3	6.5	1.2	0.000
Diamantina	5.0	5.9	1.2	0.091	5.0	4.6	0.9	0.043
Divinópolis	4.2	6.5	1.6	0.000	4.8	5.2	1.1	0.015
Governador Valadares	3.1	6.7	2.2	0.000	4.6	4.6	1.0	0.801
Itabira	5.5	7.3	1.3	0.034	5.3	6.0	1.1	0.109
Ituiutaba	4.3	9.6	2.2	0.081	3.9	3.8	1.0	0.698
Januária	2.6	5.3	2.0	0.002	4.6	5.7	1.2	0.001
Juiz de Fora	7.6	6.3	0.8	0.286	7.1	6.3	0.9	0.042
Leopoldina	6.1	7.0	1.2	0.365	4.9	4.9	1.0	0.994
Manhumirim	4.3	5.7	1.3	0.002	5.6	5.6	1.0	0.985
Montes Claros	4.0	6.3	1.6	0.001	4.7	5.1	1.1	0.014
Passos	3.9	6.6	1.7	0.001	4.5	5.1	1.1	0.272
Patos de Minas	5.2	6.6	1.3	0.401	4.2	4.6	1.1	0.039
Pedra Azul	3.3	4.5	1.4	0.206	4.9	4.1	0.8	0.006
Pirapora	4.7	5.2	1.1	0.298	4.8	5.0	1.0	0.763
Ponte Nova	7.7	7.7	1.0	0.917	5.2	5.0	1.0	0.430
Pouso Alegre	5.1	8.0	1.6	0.001	4.5	4.7	1.0	0.221
Sao João Del Rei	5.0	6.3	1.3	0.102	5.3	5.1	1.0	0.397
Sete Lagoas	5.6	9.1	1.6	0.004	5.1	5.4	1.1	0.249
Teófilo Otoni	3.5	5.8	1.7	0.001	5.1	4.7	0.9	0.017
Ubá	4.8	4.1	0.8	0.152	5.8	4.2	0.7	0.000
Uberaba	3.1	4.0	1.3	0.191	4.1	4.8	1.2	0.018
Uberlândia	3.6	5.0	1.4	0.104	4.2	4.6	1.1	0.121
Unaí	3.0	5.5	1.9	0.231	3.8	4.1	1.1	0.359
Varginha	5.8	7.0	1.2	0.029	5.0	4.7	0.9	0.090

Source: Hospital Information System of the Brazilian Unified Health System (SIH-SUS).
R%: Proportion ratio 2010/2000; RPerm: Mean day ratio 2010/2000

to 1,149,253 (8.5%) between the years 2000 and 2010. ACSH rates in the state declined significantly in the same period. However, the differences in the intrinsic characteristics of the 28 regional health units may have led to the different results observed between the units. The division of Brazilian states into regional health units is a characteristic of the decentralized health system in the national territory. They are adjacent geographical spaces with an infrastructure of shared communication and transport networks, and are formed on the basis of cultural, economic, and social identities.[d] The rationale in forming regional health units strengthens the regionalization and consolidation of healthcare networks, aiming to expand access to it and enhance the effectiveness and efficiency of health actions and services, as recommended by Decree 7,508/2011, which regulates the Organic Health Law.

Hospitalization rates for general causes and ACSH decreased between 2000 and 2010 in the overall analysis of the state, despite the growth of the population (9.5%) and the 10.2% reduction in the number of hospital beds between 2006 and 2010.[h] These results are similar to those of some Brazilian studies, such as the study by Alfradique et al (2009), which showed a 15.8% reduction in ACSH and 10.1% reduction in the other causes of hospitalization in Brazil from 2000 to 2006, a finding that was also confirmed in more recent studies.[9,19] On the other hand, two regional health units, Januária and Juiz de Fora, showed an increase in rates. In the latter, this increase corroborates with another

Table 4. Correlation between the difference in coverage by the Family Health Strategy and ratio of hospitalizations rates for ambulatory care-sensitive conditions at the regional health units between the two years compared. Minas Gerais, Southeastern Brazil, 2000 and 2010.

Regional health unit	RTx ACSH	Diff. FHS (%)	r	p
Barbacena	0.79	57.13	0.38	0.84
Pirapora	0.65	62.5	0.33	0.473
Ituiutaba	0.58	51.48	0.16	0.688
Montes Claros	0.79	49.12	0.13	0.35
Alfenas	0.70	54.33	0.11	0.582
Pedra Azul	0.98	49.07	0.11	0.615
Itabira	0.60	62.42	0.10	0.642
Coronel Fabriciano	0.58	74.58	0.02	0.932
Passos	0.72	35.26	0.02	0.926
Patos de Minas	0.61	42.56	-0.01	0.955
Teófilo Otoni	0.82	55.09	-0.03	0.851
Sete Lagoas	0.50	26.51	-0.08	0.642
Ubá	0.87	43.55	-0.10	0.595
Uberlândia	0.63	49.4	-0.14	0.579
Divinópolis	0.63	62.78	-0.22	0.107
Pouso Alegre	0.63	61.1	-0.22	0.115
Varginha	0.70	60.33	-0.22	0.127
Governador Valadares	0.65	74.83	-0.23	0.125
Juiz de Fora	1.06	54.68	-0.23	0.172
Uberaba	0.70	28.91	-0.26	0.185
Leopoldina	0.72	31.38	-0.29	0.293
Ponte Nova	0.60	57.69	-0.29	0.136
Sao João Del Rei	0.77	44.3	-0.31	0.187
Diamantina	0.88	39.81	-0.32	0.057
Manhumirim	0.70	50.84	-0.37	0.027
Unaí	0.67	33.87	-0.37	0.216
Januária	1.03	52.43	-0.38	0.053
Belo Horizonte	0.57	34.18	-0.39	0.814

ACSH: Hospitalizations for ambulatory care-sensitive conditions; FHS: Family Health Strategy; r: Pearson's correlation coefficient
RTx ACSH = 2010/2000
Diff. FHS = 2010-2000

study that indicated an increase in ACSH from 2002 to 2009[20] in the municipality of Juiz de Fora, where the regional health unit is located. This situation can be attributed to the difficulties in prioritizing primary health care in this municipality, as pointed out by Campos et al.[i]

All other regional health units in the state showed a decrease in ACSH. However, there was an increase in hospitalizations for other pathologies, such as vaccine-preventable diseases and malnutrition. The high rates of the two most frequent ACSH in both years, i.e., heart failure and gastroenteritis, in addition to the increased rates of kidney and urinary tract infections; ear, nose, and throat infections; angina pectoris; and tuberculosis – for which rates increased between the two years (2000 and 2010) – indicate that the state's needs for improvement in the effectiveness of primary health care should not be focused in only one large health field. Acute and chronic pathologies, both transmissible and nontransmissible, should be addressed; in addition, the focus should be on controlling risk factors and preventing complications, and on promoting a healthy lifestyle. Although the ACSH rates in individual regional health units is outside the scope of this study, these results indicate the need for more detailed and individualized evaluations of each regional unit, in terms of distribution by age groups. This is especially true for Leopoldina and Ubá, which recorded the highest ACSH rates in both years.

Hospitalization rates for hypertension, asthma, and diabetes mellitus decreased during this the period, albeit to a lesser extent. These diagnoses are among those included in the list of ACSH, in which the control and monitoring are part of both the Pact for Health[j] and of the priority actions of the primary health program.

The increase in hospitalizations for kidney and urinary tract infections; angina pectoris; and ear, nose, and throat infections suggests that primary health care is either less structured to deal with these diagnoses, or that these may be less sensitive to this level of care. In addition, the increase in hospitalizations for prenatal and birth disorders indicates the need for a more in-depth analysis into the relationship between prenatal monitoring and the mechanisms of reference and quality during labor and birth care.[12]

Heart failure, the most prevalent cause of ACSH in the two years studied, also represents the primary cause of hospitalization in the Brazilian public system in individuals aged > 65 years.[3] A study about hospitalizations for ambulatory care-sensitive cardiovascular conditions performed in the municipalities of the state of Goiás concluded that the rates decreased in these municipalities regardless of FHS coverage.[4] Philbin et al[17] identified that low socioeconomic status is a risk factor for cases of hospital readmission. Identifying these and other obstacles to prevent hospitalizations for heart failure is a task that requires interdisciplinary and intersectoral actions, as well as constant monitoring of the work process of the health teams.

One of the noteworthy results of this study is the increase from 4.6% to 5.4% in the proportion of deaths of individuals hospitalized because of diseases that should not have even led to their hospitalization.

Results of this study did not show any correlation between expansion of FHS and reduction in ACSH, except for the regional health unit of Manhumirim. However, studies with 1,622 Brazilian municipalities showed a negative correlation between FHS coverage and ACSH rates,[15] which is also caused by the long time taken to implement FHS in the municipalities.[18] This demonstrates that the longer the family health teams have been working, the lower the ACSH rate. Although FHS coverage of the population has increased in all regional health units of Minas Gerais in that period, this did not occur homogeneously, and ranges between 26.5% and 74.8%. Therefore, it can be inferred that the implementation of FHS contributed to both the broadening the primary health care coverage and the organization of a patient care model that adopts family health as a starting point for using the system. However, improvements at the organizational level and increased practices of these services did not occur simultaneously.[22]

There are major challenges when analyzing the effects of the actions proposed for the improvement of primary health care. The impact of health actions is influenced by multiple factors that interfere with the health-disease process, hindering the verification of an association between the actions executed and the outcomes evaluated.[14-24]

Because this is a study that uses secondary data, some aspects are worth considering. We cannot rule out the possible existence of problems in the process of recording AHA of presumable diagnoses, as well as the intentional recording of a false diagnosis aiming to obtain a higher amount of revenue from SUS.[23] However, a review of the literature on the use of data from SIH/SUS in Brazilian public health indicates that,

[i] Campos EMS, Bustamante-Teixeira MT, Bonin HB, Oliveira LZ, Cruzeiro CNL, Mauad NM, et al. Tecnologias ativas de integralidade em saúde na Atenção Básica: a experiência do município de Juiz de Fora. In: Pinheiro R, Silva Jr AIG, Mattos RA. Atenção Básica e integralidade: contribuições para estudos e práticas avaliativas em saúde. Rio de Janeiro: CEPESC-IMS/Abrasco; 2008. p.129-52.

[j] Ministério da Saúde, Secretaria Executiva, Departamento de Apoio à Descentralização. Coordenação Geral de Apoio à Gestão Descentralizada. Diretrizes operacionais dos pactos pela vida, em defesa do SUS e de gestão. 2.ed. Brasília (DF); 2006 [cited 2014 Ago 16]. (Série A Normas e Manuais Técnicos). Available from: http://www.saude.mppr.mp.br/arquivos/File/volume1.pdf

although SIH/SUS has incomplete coverage and uncertainties with regard to the reliability of its information, there is internal consistency and coherence with current knowledge, thus reinforcing the importance of this data and its usage capabilities.[8] A study in three municipalities of the state of Minas Gerais confirms that the reference list of families (Form A of SIAB) is reliable as a population base for studies.[21] Silva & Laprega observed that despite the lack of supervision and control over the quality of data produced by the teams, the system represents a potential source of extremely valuable data for planning and evaluation of health actions.[21]

Although relevant, the results of this study do not allow us to assess the impact of FHS on the ACSH rates. Some studies show that high ACSH rates in a population or subgroup may indicate serious problems of access to the health system or in its performance.[2,5,11] Therefore, it is a valuable indicator for monitoring and evaluation, and its use should seek to contemplate the demographic and regional contexts.[5] Identifying the standards of ACSH in different scenarios enables us to know one of the dimensions of effectiveness analyses, because aspects related to structure and process also affect the results on health services.

Starfield observed that one of the main goals of the health services should be to minimize disparities between population subgroups.[d] The results presented here may be extremely useful for the management of services, health care for the population, and for the quality of information, contributing to the evaluation and implementation of policies designed to shape the quality and effectiveness of primary health care, which ultimately leads to reduction of inequalities in the distribution of primary health care.

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HIGHLIGHTS

Government initiatives for consolidation of primary health care services in Minas Gerais proved ineffective in promoting the decrease in the admission rates for primary healthcare-sensitive conditions (ICSAP) during the study period. The expansion of health coverage by the Family Health Strategy showed no correlation with the decreased ICSAP rates in the period evaluated. Although the ICSAP rates decreased, a decrease in the supply of hospital beds and in the rate of hospitalization for general causes were observed. Despite the decentralization of health management in regional administrations throughout the state, the profile of hospital admissions remained unchanged, with higher rates being observed in the regional administrations of Leopoldina and Ubá.

Hospitalizations for heart failure and gastroenteritis were the main causes of ICSAP in the state. Hospitalizations for kidney and urinary tract infections, angina pectoris, ear, nose and throat infections, and prenatal- and childbirth-related diseases increased, despite the implementation of programs aimed at improving health care for these clinical conditions.

The results of the present study may contribute to the process of SUS management in Minas Gerais. The expansion of coverage by the Family Health Strategy, by itself, did not ensure the decrease in the number of hospitalizations for potentially preventable causes.

In conclusion, this study supports the implementation of strategies for evaluating the effectiveness of primary health care services in other states of the Federation, using information systems provided by the Ministry of Health and contributing to the decision-making process by managers and health care professionals.

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