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Reduction of Ambulatory Care Sensitive Conditions in Brazil between 1998 and 2009

ABSTRACT

OBJECTIVE: To describe the trends in hospitalizations for ambulatory care sensitive conditions between 1998 and 2009 in Brazil.

METHODS: The ecological time series study used secondary data on hospitalizations for ambulatory care sensitive conditions in the *Sistema Único de Saúde* (National Unified Health System). Data were obtained from the Hospital Information System. Hospital admission rates per 10,000 inhabitants were standardized by age range and gender, using the 2000 census male Brazilian population as standard. Trend analysis of the historic series was performed through generalized linear regression using the Prais-Winsten method.

RESULTS: Between 1998 and 2009, there was an average annual reduction in admissions for ambulatory care sensitive conditions of 3.7% in men (95%CI -2.3;-5.1) and women (95%CI -2.5; -5.6). The trend varied in each state, although no increase in admissions was observed in any state. In both men and women, the highest reductions were observed in hospitalizations for gastrointestinal ulcers (-11.7% a year and -12.1%, respectively), avoidable conditions (-8.8% and -8.9%) and lower respiratory diseases (-8.0% and -8.1%). Hospitalization increased only for angina (men), kidney infections and urinary tract infections (men and women) and conditions related to prenatal care and delivery (women). The three groups of illness which led to the most admissions were infectious gastroenteritis and its complications, cardiac insufficiency and asthma.

CONCLUSIONS: Between 1998 and 2009, there was a substantial reduction in admissions for ambulatory care sensitive conditions in Brazil, although some illnesses presented stability or even an increase, which calls for attention from the health sector.

DESCRIPTORS: Hospitalization, trends. Primary Health Care. Evaluation of Results of Preventive Actions. Health Services Evaluation.

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INTRODUCTION

Nations seek ways to improve the quality of their health services through more effective, efficient and equitable policies and actions to promote health, disease prevention, care and rehabilitation.[a] Increased coverage of primary care (PC) is among the most impactful initiatives.

PC became a central element of country health systems beginning with the Alma-Ata Conference in 1978, and the World Health Assembly ratified PC as fundamental to the attainment of health for all people.[7] PC is defined as a

[a] World Health Organization. What are the advantages and disadvantages of restructuring a health care system to be more focused on primary care services? Copenhagen, 2004.

combination of health interventions at the individual and collective level, involving promotion, prevention, diagnosis, treatment and rehabilitation. It is the level of care that represents the main entry point to the health system for new needs and problems of people and communities. PC offers care for all conditions, except those considered rare, and coordinates or provides the care received by users.[b]

PC is the main entry point to the *Sistema Único de Saúde* (SUS – National Unified Health System) in Brazil and involves the clinical activities of prevention, cure and rehabilitation based on the principles of universality, integration and equity. Ineffective care at this level compromises the effectiveness of all other levels, affecting the entire health system. Despite advances in the reorganization of health services in Brazil since the creation of SUS, there is a lack of studies that evaluate the impact of PC upon the health of the population.[15]

Ambulatory Care Sensitive Conditions (ACSC)[5] appeared as an indicator in the USA in the early 1990s to indirectly measure PC effectiveness. The indicator was later adapted in various countries and translated and incorporated in the Brazilian literature as *Condições Sensíveis à Atenção Primária*. It assumes that the supply and timely use of adequate quality PC can avoid or reduce the frequency of hospitalizations for some health conditions.[2,3] Therefore, elevated rates of hospital admissions for ACSC can indicate low access and use of PC services or the provision of low quality PC. Studies in different countries confirm the corollary and associate deficiencies in the PC network to elevated hospitalization rates for ACSC.[17]

Few studies analyze the evolution and geographic distribution of hospitalizations for ACSC in Brazil. The available studies are restricted to some municipalities or federative entities, cover short periods, specific age ranges or a restricted set of hospitalizations for ACSC.[8,9,16] The objective of the present study was to describe the trends in hospital admissions for ACSC in SUS from 1998 to 2009.

METHODS

The ecologic time series study was performed with secondary data on hospital admissions for ACSC in SUS from 1998 to 2009. Admission rates for ACSC per 10,000 inhabitants were analyzed for the 27 federative entities in Brazil and for each group of causes, with the rates stratified by sex.

Data were obtained from the *Sistema de Informações Hospitalares* (SIH – Hospital Information System)

made available by the *Departamento de Informática do Sistema Único de Saúde* (DATASUS – SUS Informatics Department). The SIH makes information available about admissions in public hospitals and SUS affiliated private hospitals. The population information for the calculation of admission rates per 10,000 inhabitants were made available by the Brazilian Institute of Geography and Statistics and originate from the census, population counts and intercensal estimates.

The primary cause of admissions were considered as ACSC according to Ordinance (*Portaria*) number 221/2008 by the Ministry of Health:[c] vaccine-preventable diseases (International Statistical Classification of Diseases, 10th Revision: A33-A37, A95, B16, B05-B06, B26, G00.0, A17.0, A19), avoidable conditions (A15-A16, A18, A17.1-A17.9, I00-I02, A51-A53, B50-B54, B77), infectious gastroenteritis and its complications (E86, A00-A09), anemia (D50), nutritional deficiencies (E40-E46, E50-E64), infections of the ear, nose and throat (H66, J00-J03, J06, J31), bacterial pneumonia (J13-J14, J15.3-J15.4, J15.8-J15.9, J18.1), asthma (J45-J46), lower respiratory diseases (J20, J21, J40-J44, J47), hypertension (I10-I11), angina pectoris (I20), cardiac insufficiency (I50, J81), cerebrovascular conditions (I63-I67, I69, G45-G46), diabetes mellitus (E10-E14), epilepsies (G40-G41), renal and urinary tract infection (N10-N12, N30, N34, N39.0), skin and subcutaneous tissue infection (A46, L01-L04, L08), pelvic inflammatory disease in females (N70-N73, N75-N76), gastrointestinal ulcer (K25-K28, K92.0, K92.1, K92.2), related to prenatal care and childbirth (O23, A50, P35.0).

Information from SIH for each month and all federative entities were expanded from files originally in a ".DBC" format to the ".DBF" format, using the TabWin 3.4 program. A restricted set of hospital admissions were not included, since they were unavailable in SIH: months 09/2009 in Acre, 10/2007 in Amapá and 12/2009 and 05/2000 in Roraima.

Population data were incorporated and used to calculate the hospitalization rates for ACSC per 10,000 inhabitants. The rates were standardized by age range and gender, considering the 2000 census male Brazilian population as standard. The data were exported to the statistical package STATA 9. Trend analysis of the historical series was performed by generalized linear regression using the Prais-Winstein method, with adjustment for first-order autocorrelation,[4] which allowed for analysis of hospitalization trends as stable (p > 0.05), declining (p < 0.05 and negative regression coefficient) or increasing (p < 0.05 and positive

Table 1. Trends in hospital admissions for conditions sensitive to ambulatory care according to federative entities and sex. Brazil, 1998-2009.

Federative Entity	Men			Women		
	Average annual variation (%)	95%CI	Interpretation	Average annual variation (%)	95%CI	Interpretation
North						
Acre	-1.1	-4.9; 2.8	Stable	-1.0	-5.4;3.6	Stable
Amazonas	-0.5	-5.3; 4.6	Stable	0.2	-3.4;4.1	Stable
Roraima	0.2	-7.5; 8.7	Stable	2.2	-3.9;8.7	Stable
Rondônia	-7.5	-9.1;-5.8	Reduction	-6.9	-8.1;-5.6	Reduction
Pará	-2.8	-3.8;-1.7	Reduction	-2.4	-3.0;-1.7	Reduction
Amapá	-3.1	-6.1; 0.0	Stable	-2.5	-5.7;0.9	Stable
Tocantins	-4.0	-5.2;-2.8	Reduction	-4.3	-5.8;-2.8	Reduction
Northeast						
Maranhão	-4.1	-5.4;-2.8	Reduction	-4.0	-4.7;-3.4	Reduction
Piauí	-3.0	-4.3;-1.8	Reduction	-3.2	-4.0;-2.3	Reduction
Ceará	-3.8	-4.9;-2.7	Reduction	-4.0	-5.5;-2.4	Reduction
Rio Grande do Norte	-4.7	-6.8;-2.5	Reduction	-5.1	-7.1;-3.0	Reduction
Paraíba	-3.8	-6.3;-1.1	Reduction	-4.6	-2.2;-4.6	Reduction
Pernambuco	-6.8	-7.8;-5.8	Reduction	-6.3	-7.2;-5.5	Reduction
Alagoas	-4.4	-7.9;-0.8	Reduction	-4.0	-7.5;-0.3	Reduction
Sergipe	-8.2	-12.7;-3.4	Reduction	-8.5	-13.0;-3.8	Reduction
Bahia	-2.7	-4.0;-1.4	Reduction	-3.4	-4.5;-2.3	Reduction
Southeast						
Minas Gerais	-6.0	-8.3;-3.7	Reduction	-6.0	-8.0;-4.0	Reduction
Espírito Santo	-5.2	-7.3;-3.1	Reduction	-4.7	-6.5;-2.8	Reduction
Rio de Janeiro	-5.6	-6.4;-4.7	Reduction	-5.4	-5.9;-4.8	Reduction
São Paulo	-3.9	-6.0;-1.8	Reduction	-3.5	-5.1;-1.9	Reduction
South						
Paraná	-4.7	-6.3;-3.1	Reduction	-4.6	-5.8;-3.3	Reduction
Santa Catarina	-7.0	-8.1;-6.0	Reduction	-7.0	-7.8;-6.2	Reduction
Rio Grande do Sul	-5.0	-5.9;-4.1	Reduction	-4.9	-5.6;-4.2	Reduction
Central-West						
Mato Grosso do Sul	-6.0	-9.6;-2.2	Reduction	-5.2	-9.1;-1.2	Reduction
Mato Grosso	-7.3	-9.5;-5.0	Reduction	-7.1	-9.2;-5.0	Reduction
Goiás	-4.1	-7.7;0.3	Stable	-3.3	-6.7;0.2	Stable
Federal District	-1.9	-5.3;1.7	Stable	-1.6	-4.2;3.6	Stable
Brazil	-3.7	-5.1;-2.3	Reduction	-3.7	-5.6;-2.5	Reduction

regression coefficient) in each federative entity and diagnostic group of ACSC. Average annual changes to the rates were calculated using the values obtained in the regression.[4]

RESULTS

There were 34,304,012 hospital admissions for ACSC in Brazil between 1998 and 2009, 16,484,932 (48.1%) among men and 17,819,080 (51.9%) among women. An average 2,858,668 hospital admissions occurred per year, with an average hospitalization rate of 157.6 per 10,000 inhabitants among males and 165.1 per 10,000 inhabitants among females.

The three groups of diseases that most caused hospitalizations were the same in both sexes (Figures 1 and 2). The most common cause was infectious gastroenteritis and its complications, with a hospitalization rate of 38.5 in males and 39.9 in females per 10,000 inhabitants in 1998-1999, and reaching approximately 25.0 per 10,000 men and women in 2009. Hospitalizations for cardiac insufficiency appear in second, with values fluctuating around 25.5 per 10,000 between 1998-2000, and 15.5 per 10,000 in last three years analyzed. Asthma was the third principal cause of hospitalizations, with rates slightly above 22.0 in men and 24.0 in women during the initial years and slightly above 10.0 per 10,000 during the most recent two years among both sexes.

Marked decreases, at the same magnitude in both sexes, were observed in the hospitalization trends for ACSC. Between 1998 and 2009, the average annual reduction in hospitalizations was 3.7% (Table 1). Overall, 21 states presented decreases among men and women. The most substantial were in Sergipe, Rondônia, Mato Grosso, Santa Catarina and Pernambuco. The states with stable hospitalization rates were concentrated in the North Region (Acre, Amazona, Roraima and Amapá) and Central-West (Goiás and Federal District).

The greatest reductions were observed for gastrointestinal ulcers (-11.7% per year and -12.1%, respectively), avoidable conditions (-8.8% and -8.9%) and lower respiratory conditions (-8.0% and -8.1%) for males and females. Angina pectoris (men), renal and urinary tract infection (men and women) and conditions related to prenatal care and childbirth (women) presented increased hospitalizations between 1998 and 2009 (Table 2).

DISCUSSION

This study identified a substantial reduction in hospital admissions for ACSC in Brazil between 1998 and 2009. This decrease occurred in the majority of federative entities and groups of illness/conditions, although some stability or increases occurred, which calls for attention from the health sector.

The reductions should be analyzed considering the evidence for a strong association between hospitalization for ACSC and the primary health care network. Lower hospitalization rates for ACSC are associated with greater availability of general practitioners in PC, improved user satisfaction of the health service,[20] continuity of care with the same family physician, greater number of preventive visits and more areas with health centers.[17] Independent of the burden of disease, the actual supply of physicians and improved access to primary care are associated with fewer hospitalizations for ACSC.[4] In the Brazilian context, Macinko et al[16] found lower hospitalization rates for ACSC in regions with greater coverage by the Family Health Strategy (FHS) and higher levels of hospitalization in regions with a greater quantity of beds in private hospitals.

Hospitalization for ACSC can be avoided or decreased by PC activities. For vaccine preventable diseases or those that allow for early diagnosis and treatment (tetanus and rheumatic fever), hospitalizations can be avoided; in chronic problems, PC can improve management of the disease and accompaniment of the user, avoiding complications or reducing reoccurrence of hospitalization (for example, diabetic coma and cardiac insufficiency).[6] Brazil is undergoing a large expansion of the FHS, especially since the second half of the 1990s. Population coverage by the FHS increased
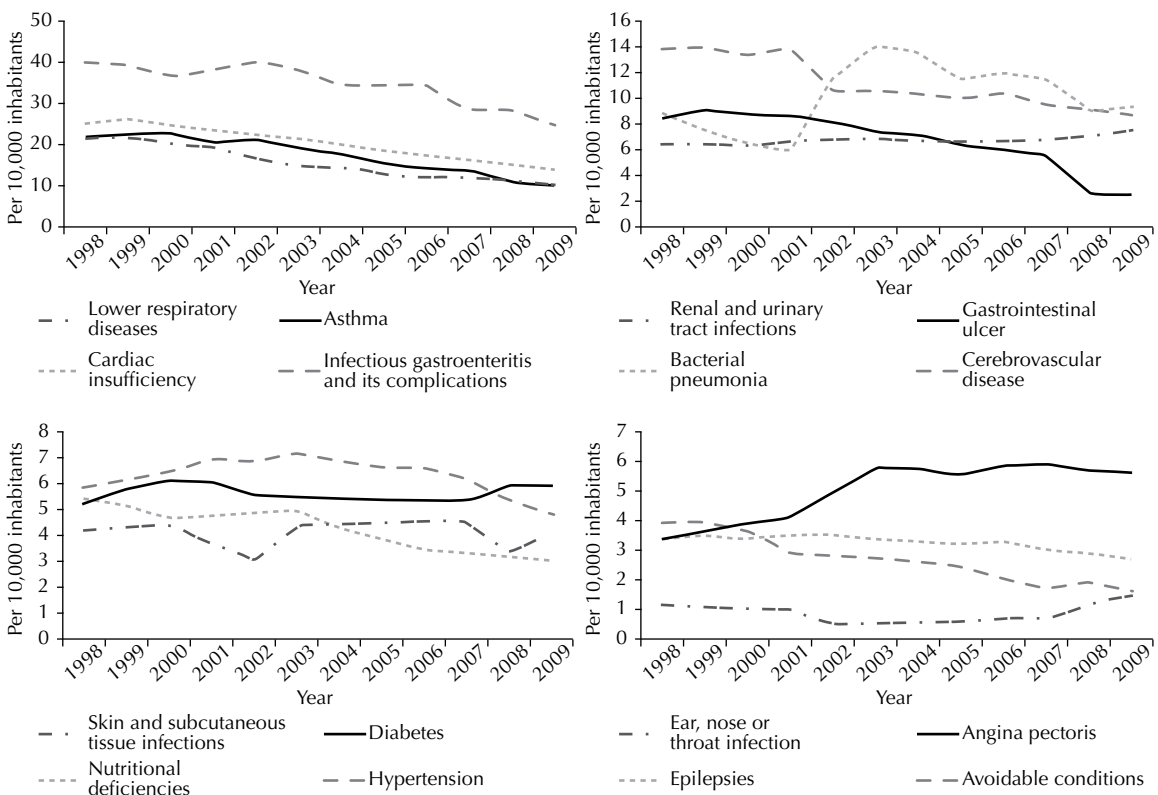

Figure 1. Historic series of hospitalization rates in men for ambulatory care sensitive conditions according to cause. Brazil, 1998-2009.
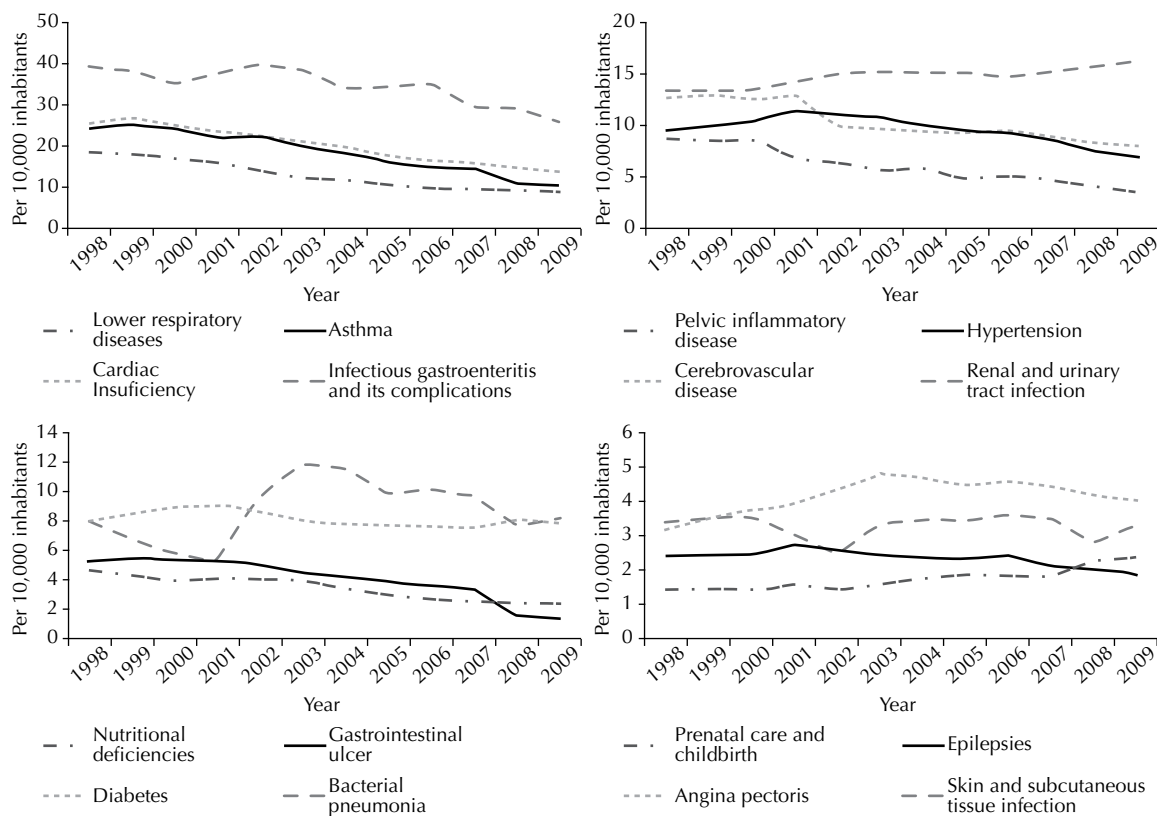
Figure 2. Historic series of hospitalization rates in women for ambulatory care sensitive conditions according to cause. Brazil, 1998-2009.

from 6.6% in 1998 to 50.7% in 2009. The number of Family Health Teams was 0.3 per 1,000 inhabitants in 1994 and reached 31.6/10,000 in 2010. In 2011, approximately 17% of municipalities had implemented Support Nuclei for Family Health (*Núcleos de Apoio à Saúde da Família*).[d] This expansion has an important impact on the access and use of primary care, with the potential to reduce ACSC hospitalizations.

The expansion of the FHS in Brazil and extent of its implementation happened in an unequal manner across the regions of the country and may be affecting the differences in reductions between the federative entities. Difficulties in implementation of the strategy for smaller municipalities occur in large urban centers, which often have problems such as vertical programs and exclusionary access to health services.[23] This lack of access to quality PC can lead to the maintenance of high admission rates for ACSC. Nonetheless, factors such as socioeconomic conditions and the supply of private or specialized health services, impact hospitalization rates for ACSC and may influence regional differences.[1]

The reduction in hospitalizations was not linear for all causes; vaccine-preventable diseases remained stable, and there was an increase among women related to prenatal care and childbirth. In the first case, despite the exemplary immunization program in Brazil, there are deficiencies in vaccine coverage related to lack of inputs and immunobiologics, lack of community health workers in vaccination campaigns and resistance among some people to vaccinate.[12,13] In regards to prenatal care, during the middle of the period analyzed, one in every five women performed six or more prenatal visits, less than half received tetanus immunization and 5% performed all the care activities stipulated for prenatal care in Brazil.[22]

A study limitation is that the analysis was restricted to hospital admissions in SUS (in public and SUS affiliated private and philanthropic hospitals). Nonetheless, the SIH has the advantage of national coverage and includes approximately 70% of all hospitalizations in the country.[e] Its financial accounting purposes and incomplete responses to the form authorizing hospital admission are considered negatives,[14] although it has

Table 2. Trends in hopsital admissions for ambulatory care sensitive conditions according to cause and sex. Brazil, 1998-2009.

Ambulatory care sensitive conditions	Men			Women		
	Average annual variation (%)	95%CI	Interpretation	Average annual variation (%)	95%CI	Interpretation
Vaccine-preventable diseases	-1.3	-4.5;2.0	Stable	-1.9	-4.5;0.9	Stable
Avoidable conditions	-8.8	-10.2;-7.4	Decrease	-8.9	-10.6;-7.2	Decrease
Infectious gastroenteritis and its complications	-3.5	-5.1;-1.9	Decrease	-3.1	-4.6;-1.6	Decrease
Anemia	0.1	-6.5;7.2	Stable	0.4	-7.7;7.4	Stable
Nutritional deficiencies	-6.4	-8.5;-4.1	Decrease	-7.7	-9.7;-5.7	Decrease
Infections of the ear, nose and throat	2.4	-9.6;16.0	Stable	2.9	-9.7;17.2	Stable
Bacterial pneumonias	2.3	-4.5;9.6	Stable	2.2	-4.4;9.4	Stable
Asthma	-6.5	-8.6;-4.3	Decrease	-7.7	-9.4;-5.9	Decrease
Lower respiratory diseases	-8.0	-8.5;-7.5	Decrease	-8.1	-9.6;-6.6	Decrease
Hypertension	-3.6	-7.8;0.7	Stable	-5.1	-8.9;1.0	Stable
Angina pectoris	4.9	1.5;8.3	Increase	-0.2	-4.2;3.9	Stable
Cardiac insufficiency	-7.3	-8.6;-5.9	Decrease	-8.3	-9.4;-7.1	Decrease
Cerebrovascular disease	-6.4	-7.4;-5.3	Decrease	-6.8	-7.8;-5.6	Decrease
Diabetes mellitus	0.5	-1.2;2.1	Stable	-0.6	-2.0;0.8	Stable
Epilepsies	-2.2	-3.2;-1.1	Decrease	-2.0	-3.6;-0.5	Decrease
Renal and urinary tract infections	0.1	-0.7;0.9	Increase	1.4	0.4;2.3	Increase
Skin and subcutaneous tissue infections	-0.4	-3.2;2.5	Stable	-0.8	-3.3;1.8	Stable
Pevlic inflammatory disease in females	-	-	-	-8.0	-8.8;-7.2	Decrease
Gastrointestenal ulcer	-11.7	-18.0;-4.9	Decrease	-12.1	-18.1;-5.6	Decrease
Related to prenatal care and childbirth	7.8	-1.9;18.5	Stable	4.8	3.0;6.7	Increase

been increasingly used for epidemiologic purposes which contribute to its critique and improvement.

Differences between the lists of ACSC adopted in each country preclude direct comparisons regarding the magnitude of hospitalizations and their time trends. Significant reductions have been reported in various countries independent of the list utilized, as in the present study. In Singapore, Niti & Ng[18] described a decrease of 9.1% from 1991 to 1998. In Canada, Sanchez et al[21] reported a decrease of 22% between two year periods from 2001-2002 and 2006-2007. The same trends were observed in Italy between 1997-2000,[19] the United States between 1997-2007,[11] and in the Brazilian state of Santa Catarina with groups of diseases from 1999 to 2004.[9]

The reduction in hospital admissions for ACSC has been substantial. Considering its association with expanded PC coverage during the study period, the improved supply of health services may have made an important contribution to reducing hospitalizations. Nonetheless, the PC network has short-comings in its quality and effective implementation. Evaluation of the FHS in the South and Northeast of Brazil demonstrated that 34% of employees participated in a public test for selection, less than half of potential users used the health services in their coverage area and lack of employment contracts were more common in the FHS (51%) than in traditional PC (32%).[10] There is the potential for continued reduction of hospitalizations for ACSC of even greater intensity than observed between 1998 and 2009. The continued increase of FHS coverage, together with quality management and performance of the conceptual mandates of PC, should be priorities for the health sector in Brazil during the coming years.

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