Original article

Hospitalization for ambulatory care-sensitive conditions in the state of Rondônia, Brazil: a descriptive study of the period 2012-2016

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Abstract

Objective: to describe the frequency and reasons for hospitalizations for ambulatory care-sensitive conditions (HACSC) in Rondônia, Brazil, between 2012 and 2016, and to analyze their relationship with the evolution of the coverage of the family health strategy (FHS) in the same period. **Methods:** this was a descriptive study of secondary data from the Brazilian National Health System's Hospital Information System. **Results:** during the period of the study 133,958 HACSC were authorized, corresponding to a rate of 75 hospitalizations/1,000 inhab.; there was a parallel annual increase in FHS coverage and a slightly decreasing trend of authorized HACSC, although this was not statistically significant; in 2012, HACSC frequency was 20.7% in relation to all hospitalizations that occurred in the state, while in 2016 this indicator declined to 16.7%. **Conclusion:** HACSC frequency in Rondônia was high between 2012 and 2016; although there was an increase in FHS coverage in the same period, this increase was not accompanied by a significant change in the frequency of HACSC registered in the state.

Keywords: Primary Health Care; Family Health Strategy; Epidemiology, Descriptive.

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Introduction

The primary level of health care (PHC) has the capacity to respond to 75 to 85% of the health needs of a community. This level of care is expected to be the entry point to the health service to meet all new health needs and problems of the population. It is also expected to provide care to people over the course of time, to care for the majority of health conditions - except very uncommon or rare conditions - and to coordinate or integrate care provided at other points in the health care network.[1]

> *Ambulatory Care Sensitive Conditions are health conditions for which effective PHC actions can reduce the risk of hospitalization.*

Evaluating PHC quality is fundamental for the management of its organization and practice, in the quest for excellent performance at this level of care. To this end indicators are used, these being succinct measures of relevant information not only about certain attributes and dimensions of the health situation, but also about the performance of the health system.[2-4]

Ambulatory Care Sensitive Conditions (ACSC) are health conditions for which effective PHC actions can reduce the risk of hospitalization.[3] Activities focused on early diagnosis and proper treatment of acute diseases, control and monitoring of chronic conditions, will have a direct impact on reducing the incidence of common diseases and, consequently, ACSC as well.[4]

With effect from the 1980s, hospitalizations for ambulatory care-sensitive conditions (HACSC) began to be considered as an indicator that enables evaluation of the first level of health care. Reduction in hospitalizations due to ACSC is a reflection of effective care and case management in PHC.[3]

In 2008, the Brazilian Ministry of Health established the first Brazilian list of ACSC by means of Ordinance SAS/MS No. 221, dated 17 April 2008. This list includes 120 three-digit categories and 15 four-digit subcategories taken from the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), grouped together in accordance with the possibility of interventions and disease magnitude, thus resulting in 19 diagnostic groups. The Brazilian ASCS list was drawn up based on consensus between researchers and health service managers, including the establishment of the use of the HACSC indicator for evaluating and monitoring the health care system through a single instrument.[5] Despite its limitations, usually attributed to regional differences in installed health service capacity, prudent use of the HACSC indicator can help to increase PHC effectiveness, by identifying priority areas for intervention and making evident health problems that need better follow-up and coordination between levels of care.[6,7]

While reductions in HACSC proportions or rates suggest possible improvements in PHC, when these rates are high this is not always indicative of deficiencies in primary care, but rather a warning signal that in-depth investigation is needed in the places where they occur.[8] Patients' characteristics, variability in the criteria used to indicate the need for hospitalization and the admission policies of tertiary care centers are some of the variables capable of contributing to increases or decreases in the HACSC indicator.[9]

Information about HACSC may inform objective analysis of the health situation in a given locality or region, with a view to evidence-based decision-making and the proposition of health actions more aligned with the needs of the population. Considering national and state-level public health policies, especially the need for PHC organization and evaluation in emerging areas of Brazil, the study of HACSC frequency and characterization in Rondônia proposed here is justified. It is expected that this knowledge can contribute to the construction of a quality Brazilian National Health System (SUS) in that state. The objective of this study was therefore to describe the profile of HACSC in Rondônia, between 2012 and 2016, as a preliminary proposal to provide information on the quality of state-level PHC there.

Methods

An ecological study was conducted taking the unit of analysis to be hospitalizations throughout the state of Rondônia in the period between 2012 and 2016, recorded on the Brazilian National Health System Hospital Information System (SIH/SUS). Rondônia is located in the Northern Brazilian region, occupies an area of 237,576 km² and comprises 52

municipalities inhabited by 1,787,279 people.[10] All the hospitalizations that occurred in the state between 2012 and 2016 were eligible for this study, while analysis was performed on those cases admitted to hospital because their primary diagnosis was that of a condition found on the list of ACSCs.[5] In parallel, an analysis was made of the situation of the Family Health Strategy (FHS) coverage in all the state's municipalities, using data provided by the Brazilian Ministry of Health's Department of Primary Health Care which were representative of an estimated proportion of FHS team population coverage in a defined territory.[6] The health conditions considered for HACSC were based on the Brazilian list of ACSC as defined by Ordinance SAS/MS Nº 221/2008.[5] Data related to population of the state of Rondônia in 2016 were obtained from the Brazilian Institute of Geography and Statistics (IBGE) website.[10]

In order to initially identify HACSC, a SIH/SIS spreadsheet was generated based on the selection of the causes of hospital admissions according to their respective ICD-10 code. We used Tabwin version 3.5, developed by the Brazilian National Health System Information Technology Department (DATASUS) to convert the database formats;[11] we then tabulated and analyzed the data using EpiData version 2.2.3.

In addition to causes of hospitalization and FHS coverage, we also analyzed other relevant information found on the Hospital Admission Authorization forms (IHA-SUS) in order to obtain the demographic characterization of the patients: sex, age, ethnicity/skin color and municipality of residence. The specific characteristics of HACSC analyzed were the year when hospitalization occurred, medical specialty under which the patient was hospitalized, nature of hospitalization (whether elective or emergency), length of inpatient stay, need for intensive treatment and evolution to death.

Initially, we described HACSC frequency in relation to all hospitalizations that occurred during the period and the evolution of FHS coverage for Rondônia state and all its municipalities. We also calculated the proportion of HACSC in relation to all hospitalizations that occurred during the period, for the state of Rondônia and its municipalities, as well as the HACSC rate (per 1,000 inhab.). The hospitalization rate was calculated by dividing the number of HACSC by the population estimated by IBGE for 2016. Subsequently, the demographic and clinical characteristics of the patients were summarized. We carried out ecological analysis with the aim of assessing the relationship between HACSC frequency from 2012-2016 and the evolution of FHS coverage in the same period. To this end, Spearman's correlation coefficient was determined based on an alpha error of 0.05.

The study project was not submitted to the appraisal of a Research Ethics Committee because it was based on secondary public domain data, in accordance with National Health Council Resolution CNS/MS No. 510, dated 7 April 2016. Notwithstanding, the rules in force relating to ethics in research with human beings in Brazil were complied with. The data were analyzed specifically for this research in a global manner, without any individual identification of persons registered on the hospital admissions information system.

Results

Between January 2012 and December 2016, 133,958 hospitalizations for ambulatory care-sensitive conditions in SUS public health services and outsourced services were notified in the state of Rondônia. HACSC accounted for 24.8% of all SUS hospitalizations recorded in the state in the period analyzed. Of the hospitalizations analyzed, 62,994 (47.0%) were male and 70,964 (53.0%) were female. Elderly patients (39.6%) and adults between 20 and 49 years old (26.4%) comprised the majority of these hospitalizations. Patients' mean age was 38.4 (standard deviation [SD] = 38.3) years. Although information on ethnicity/color had been omitted for a large proportion (58.4%) of patients, brown skin color was the most frequently (31.6%) recorded for the remaining HACSC (Table 1).

FHS coverage was 66.9% for the state of Rondônia as a whole, progressing from 60.4% in 2012 to 71.3% in 2016 (Table 1). However, this service had still not been implanted in two municipalities; eight municipalities had 100% FHS coverage ; while in the remaining municipalities FHS coverage varied considerably, from 35.8 to 100%. The municipalities of Porto Velho (11.4%), Ji-Paraná (8.3%), Rolim de Moura (6.6%), Cacoal (5.9%) and Vilhena (5.2%) were those that most recorded HACSC in the period, totaling 37.4% of all hospitalizations

(Table 2). The HACSC rate per municipality varied from 21.8/1,000 to 228.9/1,000 inhab. in the period, being higher in the municipalities of Cerejeiras (228.9/1,000 inhab.), Santa Luzia d' Oeste (198.0/1,000 inhab.), Alta Floresta d'Oeste (197.0/1,000 inhab.), Cabixi (190.1/1,000 inhab.) and Novo Horizonte do Oeste (157.0/1,000 inhab.). For the state of Rondônia as a whole, the hospitalization rate due to HACSC was 75.0/1,000 inhab. in the period analyzed (Table 2).

Table 1 – Frequency, Family Health Strategy coverage and demographic characteristics of patients hospitalized for ambulatory care sensitive conditions, Rondônia, 2012-2016

Characteristics	N	%
Year[a]		
2012	27,695	20.7
2013	28,359	21.2
2014	29,860	22.3
2015	25,687	19.2
2016	22,357	16.7
Total period	133,958	24.8
FHS Coverage[b]	–	
2012	–	60.4
2013	–	63.1
2014	–	68.7
2015	–	70.9
2016	–	71.3
Total for the state	–	66.9
Sex		
Male	62,994	47.0
Female	70,964	53.0
Age (in years)		
Mean (SD[c])	38.4 (38.3)	
Median (Q1;Q3)	36.0 (10.0;64.0)	
Age group (in years)		
0-4	19,788	14.8
5-9	12,469	9.3
10-19	13,343	10.0
20-49	35,354	26.4
50-100	53,004	39.6
Ethnicity/skin color		
White	8,902	6.6
Black	1,186	0.9
Brown	42,376	31.6
Asian	983	0.7
Indigenous	2,265	1.7
No information	78,246	58.4

a) proportion of hospitalizations for ambulatory care-sensitive conditions (HACSC) in relation to total of hospitalized patients.
b) FHS: Family Health Strategy.
c) SD: standard deviation.

Table 2 – Distribution, per municipality of residence, of the Family Health Strategy coverage, number and rate of hospitalizations for ambulatory care-sensitive conditions, Rondônia, 2012-2016

Municipality of residence	FHS[a] coverage in 2016 (%)	HACSC[b]		Population in 2016	HACSC rate (per 1,000 inhab.)
		N	%		
Alta Floresta d'Oeste	68.6	5,025	3.8	25,506	197.0
Alto Alegre dos Parecis	91.7	2,082	1,6	13,993	148.8
Alto Paraíso	83.9	1,496	1.1	20,569	72.7
Alvorada d'Oeste	100.0	1,554	1.2	16,902	91.9
Ariquemes	55.3	5,422	4.0	105,896	51.2
Buritis	62.8	1,719	1.3	38.450	44.4
Cabixi	97.5	1,196	0.9	6,289	190.1
Cacaulândia	90.3	421	0.3	6,414	65.6
Cacoal	70.6	7,910	5.9	87,877	90.0
Campo Novo de Rondônia	89.5	1,634	1.2	14,354	113.8
Candeias do Jamari	84.1	758	0.6	24,719	30.6
Castanheiras	97.1	259	0.2	3,583	72.2
Cerejeiras	93.8	4,112	3.1	17,959	228.9
Chupinguaia	–	423	0.3	10.364	40.8
Colorado do Oeste	92.5	2,772	2.1	18,639	148.7
Corumbiara	98.5	365	0.3	8,659	42.1
Costa Marques	82.5	777	0.6	17,400	44.6
Cujubim	47.6	583	0.4	21,720	26.4
Espigão d'Oeste	73.8	3,371	2.5	32.712	103.0
Governador Jorge Teixeira	100.0	963	0.7	9,933	96.9
Guajará-Mirim	72.2	5,902	4.4	47,048	125.4
Itapuã do Oeste	66.9	225	0.2	10.310	21.8
Jaru	37.1	5,334	4.0	55,806	95.5
Jí-Paraná	76.0	11,117	8.3	131.560	84.5
Machadinho d'Oeste	72.8	2,194	1.6	37,899	57.9
Ministro Andreazza	94.6	1,396	1.0	10,786	129.4
Mirante da Serra	84.1	1,430	1.1	12,308	116.2
Monte Negro	89.2	1,805	1.3	16,032	112.6
Nova Brasilândia d'Oeste	79.6	3,191	2.4	21,670	147,2
Nova Mamoré	73.3	2,119	1.6	28,255	75.0
Nova União	88.5	555	0.4	7,796	71.2
Novo Horizonte do Oeste	67.9	1,595	1.2	10,161	157.0
Ouro Preto do Oeste	86.6	5,364	4.0	39,840	134.6
Parecis	86.0	581	0.4	5.802	100.1
Pimenta Bueno	63.9	4,562	3.4	37,786	120.7
Pimenteiras do Oeste	–	310	0.2	2.410	128.6
Porto Velho	54.0	15,258	11.4	511,219	29.8
Presidente Médici	92.6	2,301	1.7	22,337	103.0

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a) FHS: Family Health Strategy.
b) HACSC: hospitalizations for ambulatory care-sensitive conditions.

Table 2 – Distribution, per municipality of residence, of the Family Health Strategy coverage, number and rate of hospitalizations for ambulatory care-sensitive conditions, Rondônia, 2012-2016

Municipality of residence	FHS[a] coverage in 2016 (%)	HACSC[b]		Population in 2016	HACSC rate (per 1,000 inhab.)
		N	%		
Primavera de Rondônia	98.5	289	0.2	3,456	83.6
Rio Crespo	88.1	129	0.1	3,829	33.7
Rolim de Moura	79.1	8,861	6.6	56,664	156.3
Santa Luzia d'Oeste	100.0	1,655	1.2	8,362	198.0
São Felipe d'Oeste	97.7	256	0.2	5,994	42.7
São Francisco do Guaporé	100.0	1,397	1.0	16,636	84.0
São Miguel do Guaporé	53.5	2,444	1.8	19,353	126.2
Seringueiras	100.0	1,025	0.8	11,619	88.2
Teixeirópolis	100.0	470	0.4	4,778	98.3
Theobroma	100.0	569	0.4	10,575	53.8
Urupá	81.6	633	0.5	12,687	49.9
Vale do Anari	35.8	431	0.3	9,633	44.74
Vale do Paraíso	100.0	798	0.6	7,961	100.2
Vilhena	84.6	6,920	5.2	93,745	73.8
Rondônia	66.9	133,958	100.0	1,787,279	75.0

a) FHS: Family Health Strategy.
b) HACSC: hospitalizations for ambulatory care-sensitive conditions.

The municipality of Porto Velho, which had low FHS coverage (54.0%), had a high proportion (11.4%) of HACSC in the period. However, municipalities with total FHS coverage (100%) were found, in general, to have low proportions (<1.5%) of HACSC in the period. Notwithstanding, the HACSC rate was not aligned with FHS coverage in the state: for example, municipalities with 100% FHS coverage, such as Alvorada d'Oeste, Governador Jorge Teixeira, Santa Luzia d'Oeste, Teixeirópolis and Vale do Paraíso had HACSC rates above 90/1,000 inhab. in the period analyzed (Table 2).

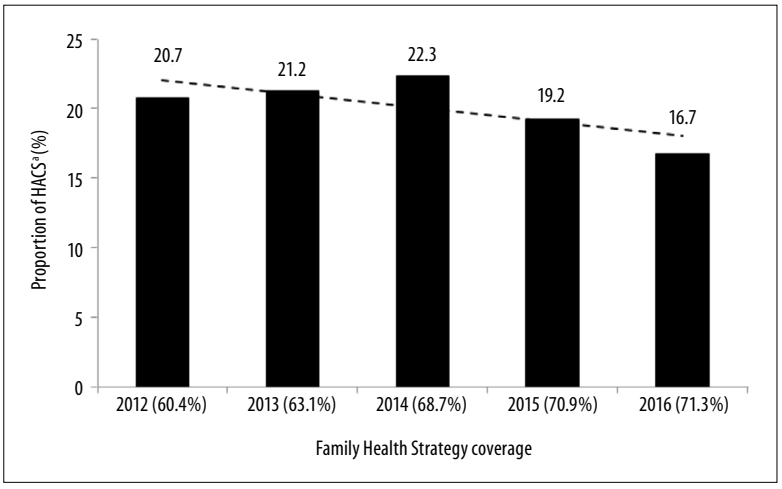
The annual percentage rate of hospital admissions showed a progressive reduction in the period studied, being 16.2, 16.4, 17.1, 14.5 and 12.5 per 1,000 inhab. in 2012, 2013, 2014, 2015 and 2016, respectively (Table 3). Although a progressive decrease in the HACSC proportion was seen in the five years analyzed (Table 1), this reduction was not statistically correlated to the elevation of global FHS coverage in the state (Spearmans correlation coefficient = -0.60; p = 0.285) (Figure 1).

The main causes of HACSC in the period analyzed were related to infections of the urinary tract, which accounted for 188.6/1,000 HACSC. Also standing out was bacterial gastroenteritis and its complications, which accounted for 178.2/1,000 HACSC. Among chronic diseases that can be controlled in PHC, diabetes mellitus (76.6/1,000), arterial hypertension (66.9/1,000), infections of the skin and subcutaneous tissue (66.9/1,000) and heart failure (66.0/1,000) were the conditions most frequently leading to HACSC. Lung diseases (74.1/1,000) and ear, nose and throat infections (50.1/1,000) were the next most prevalent groups of causes in the period. Also worthy of highlight are vaccine-preventable diseases, the frequency of which was considerable among HACSC in Rondônia (Table 3).

Of all the HACSC occurring between 2012 and 2016, 121,365 (90.6%) were classified as urgent hospital admissions and 12,593 (9.4%) as elective admissions. General medicine (68.0%) and pediatric (26.3%) hospitalizations predominated. Average length of inpatient stay was 3.9 days (SD: 5.9). A total of 130,952 (97.8%) patients did not require intensive treatment during the hospitalization period and only 2.9% of them evolved to death (Table 4).

Table 3 – Hospitalizations for ambulatory care-sensitive conditions according to hospitalization year and causes, Rondônia, 2012-2016

Year/Cause	N	Rate (per 1,000 inhab.)
Hospitalization Year		
2012	27,695	16.2
2013	28,359	16.4
2014	29,860	17.1
2015	25,687	14.5
2016	22,357	12.5
Total period	133,958	75.0
Preventable Diseases		Frequency (per 1,000 admissions)
Whooping cough	129	1.0
Acute hepatitis B	162	1.2
Mumps	72	0.5
Tetanus	16	0.1
Diphtheria	6	0.04
Meningitis	4	0.03
Measles	3	0.02
Other causes		
Urinary tract infection	25,270	188.6
Bacterial gastroenteritis and complications	23,871	178.2
Diabetes mellitus	10,256	76.6
Lung diseases	9,922	74.1
Arterial hypertension	8,966	66.9
Skin and subcutaneous infection	8,965	66.9
Heart failure	8,841	66.0
Ear, nose and throat infections	6,704	50.1
Cerebrovascular diseases	5,769	43.1
Asthma	4,920	36.7
Diseases related to pregnancy and childbirth	4,311	32.2
Epilepsies	2,993	22.3
Bacterial pneumonias	2,584	19.3
Pelvic inflammatory disease	2,504	18.7
Malaria	1,873	13.9
Angina	1,845	13.8
Gastrointestinal ulcer	1,428	10.7
Nutritional deficiencies	1,154	8.6
Pulmonary tuberculosis	635	4.7
Anemia	574	4.3
Rheumatic fever	122	0.9
Syphilis	22	0.2
Extrapulmonary tuberculosis	20	0.2
Ascariasis	17	0.1



a) HACSC: Hospitalizations for ambulatory care-sensitive conditions.
Note: Spearmans correlation coefficient = -0.60; p = 0.285.

Figure 1 – Time trend of the proportion of hospitalizations for ambulatory care-sensitive conditions and Family Health Strategy coverage, Rondônia, 2012-2016

Discussion

This study found a high overall rate of HACSC in the state of Rondônia during the five-year period between 2012 and 2016. In the analysis stratified by municipalities, we found high HACSC rates in multiple locations, reaching rates higher than 50 hospitalizations/1,000 inhab. Despite this, we highlight the slight but progressive reduction in HACSC, together with a gradual increase in FHS coverage in Rondônia during the period analyzed. The same panorama was found in other Brazilian states in the early 2000s, when the proportion of HACSC was generally greater than 20%, although it has reduced in recent years.[12-14]

A study conducted in Brazil's Federal District, with the purpose of analyzing the coefficients of hospitalizations for ambulatory care-sensitive conditions in 2008, showed that 20% of the total number of hospitalizations related to ACSC.[15] In another study conducted in São Paulo in 2011, 15.9% of hospitalizations were related to care-sensitive conditions.[16] High HACSC frequencies have also been reported by Caldeira et al.,[12] Ferreira et al.[13] and Mendonça,[14] reaching proportions of between 20 and 45%. The high frequency of HACSC observed in this and previous studies can be interpreted as a deficiency in the quality and effectiveness of PHC, especially in regions where FHS is not yet fully implemented.[4,17] In addition, compared to frequencies found in other Latin American countries, the HACSC frequency found in Rondônia is worrying. Analysis of 39 million hospital admissions in Argentina, Colombia, Costa Rica, Ecuador, Mexico and Paraguay found 14.3% HACSC, with rates ranging from 10.8% (Costa Rica) to 21.6% (Colombia).[18]

The reduction in the proportion and the rate of HACSC observed over the course of the five-year period selected followed the trend found for Brazil as a whole and for some states where primary care is better structured.[19-22] The Family Health Strategy, recognized as an effective strategy for organizing and building the capacity of Primary Health Care, has been considered to be one of the major determinants of this reduction.[17,24] Indeed, the increase in local and regional FHS coverage appears to be associated with the reduction in HACSC, even though the classic problems linked to primary health care continue to exist, such as economic, social and political factors, as well as certain problems proper to health services, which are capable of influencing the risk of hospitalization.[25-27]

Small municipalities with 100% FHS coverage showed high proportions of HACSC recorded in the period studied. It is known that FHS coverage is inversely proportional to population size. However, previous studies have shown that HACSC rates increase as municipal population size decreases.[25] A likely explanation for this apparent discrepancy would be the lower problem-solving capacity of health

Table 4 – Clinical characteristics of 133,958 patients hospitalized for ambulatory care sensitive conditions, Rondônia, 2012-2016

Characteristics	N	%
Length of stay (days)		
None	1,846	1.4
1-3	94,157	70.3
4-7	25,339	18.9
8-15	8,493	6.3
>15	4,123	3.1
Mean (SD[a])	3.9 (5.9)	16,7
Nature of hospitalization		
Elective	12,593	9.4
Urgency	121,365	90.6
Medical specialty		
Surgery	3,322	2.5
Obstetrics	4,044	3.3
General medicine	91,136	68.0
Chronic	6	0.01
Phthisiology	202	0.2
Pediatrics	35,248	26.3
Need for intensive treatment		
Yes	3,006	2.2
No	130,952	97.8
Evolution to death		
Yes	3,939	2.9
No	130,019	97.1

a) SD: standard deviation.

services in smaller municipalities. Lack of specialized infrastructure and capacity to respond to the various health situations of service users, ultimately leads to hospitalization for all health conditions, regardless of whether or not they are primary care-sensitive conditions.[17,25] In general, small-sized municipalities play a local role, attending to the basic needs of the population, and depend on medium or large size municipalities for various services, in particular higher complexity health services.[28,29] Similarly, the high proportion of urgent HACSC suggests that access to hospitalization occurs through services other than PHC services.[30]

We found a considerable proportion of HACSC in children aged under 9 years old (42.8%), possibly related to higher prevalence of gastroenteritis and other acute infections, transmitted by food and water, in the context of the Northern Region. Despite some progress with treated water and sewage collection and treatment services, basic sanitation is very lacking in Rondônia.[10] A similar result was found by Caldeira et al.[12] in Montes Claros, in the state of Minas Gerais, where the proportion of HACSC in the pediatric age group was 41.4% whereby, according the authors of that study, children, and in particular breastfed babies, are more susceptible to diseases and are a greater cause of concern for their families and health professionals, so that the latter are more inclined to recommend hospitalization. Other explanations for the proportion found in this age group would be limited access to health services and difficulties faced by primary care professionals in managing the clinical conditions of younger children.[12]

The profile of the causes that lead to HACSC in Rondônia was quite varied. The most frequent health conditions found do not differ from the expected, according to a systematic review on the theme: the studies included in the review highlighted that the main diagnoses leading to HACSC in Brazil are urinary tract infections, gastroenteritis, bacterial pneumonia and heart failure.[7] It is also important to highlight that HACSC in Rondônia included various vaccine-preventable diseases. For example, 16 patients were hospitalized because of tetanus. These findings, together with non-communicable chronic diseases (diabetes mellitus and arterial hypertension), are conditions that can be controlled in primary health care and, therefore, also point to a deficit in quality of care at the most basic level of health care.[31]

Although all the results found in the analysis of HACSC in Rondônia were consistent with those of several other Brazilian studies, some limitations of our study should be emphasized. For example, we only analyzed HACSC at public hospitals or private SUS outsourced hospitals. This probably underestimated this indicator, above all because a considerable portion of Rondônia's population lives far away from large urban centers and for them hospital services are still predominantly private. Another limitation of this study refers to information about the diagnosis that led to the hospitalization which was collected only from SUS hospital admission authorization forms. This document is open to criticism, since the cause of hospitalization often differs from the definitive diagnosis, i.e., the diagnosis at the time of hospital discharge.[12] Moreover, as the assessment of the relationship between FHS expansion and HACSC was based on secondary data, it may not be accurate, since it addresses the situation in the municipality as a whole, not stating whether the hospitalized individuals were previously treated in PHC/FHS facilities. In addition, there is a limitation due to underreporting on SIH/SUS, possible classification problems in relation to the ICD-10 codes used, and possible double or triple counting of the same patient, because the system does not allow identification of readmissions.

The results of our study showed a high frequency of HACSC in Rondônia. Although there was a slight increase in FHS coverage between 2012 and 2016, this increase was not accompanied by significant changes in the frequency of hospitalizations for ambulatory care-sensitive conditions in Rondônia. It is expected that the information produced, which has been summarized here, can serve as an alert and concern for Rondônia's health authorities and, consequently, encourage the implementation of measures to increase Family Health Strategy coverage in all the municipalities of Rondônia state.

Authors' contributions

Santos BV and Lima DS contributed to the study conception and design, data analysis and interpretation and writing the manuscript. Fontes CJF contributed to obtaining, analyzing and interpreting the data and revised the final version of the manuscript. All authors approved the final version and declared themselves to be responsible for all aspects of the study, ensuring its accuracy and integrity.

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