# HOSPITAL ADMISSIONS FOR SENSITIVE CONDITIONS TO PRIMARY HEALTH CARE

*Internações hospitalares por condições sensíveis à atenção primária à saúde*

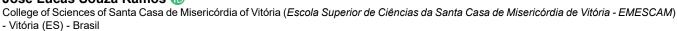*Ingresos hospitalarios por condiciones sensibles de la atención primaria de salud*

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**ABSTRACT**

**Objective:** To analyze hospital admissions for sensitive conditions to Primary Health Care in the state of Minas Gerais, Brazil. **Methods:** It is an ecological study with population-based time series design in the state of Minas Gerais, concerning the hospital admissions and the main causes of them for sensitive conditions to primary care. The analysis was performed based on the Hospitalization Authorization according to the costs, year, gender, and age group based on data from the Hospital Information System (SIH). The micro data were extracted from the file transfer service at the Department of Informatics of Brazil's Unified Health System (DATASUS) in June 2018. The records analyzed refer to the period from January 2008 to December 2017, including all hospitalizations for sensitive conditions to primary health care. **Results:** It was evident that from 2008 to 2017, hospitalizations sensitive to primary care accounted for 21.21% (2,506,782) of the total hospitalizations in the state of Minas Gerais, with Jequitinhonha Region followed by the Northeast and Center South contributing to the higher percentages. Regarding causes, the highest prevalence is concentrated in circulatory system diseases 54.22% (816,617), followed by respiratory system diseases 43.48% (586,809), endocrine diseases 85.70% (325,082), genitourinary diseases 37,13% (309,281) and infectious and parasitic diseases 38.37% (266,294). **Conclusion:** Hospital admissions due to sensitive conditions to Primary Health Care in the state of Minas Gerais follow a national pattern, but although hospitalizations are decreasing, it still represents more than 20% of all hospitalizations.

**Descriptors:** Primary Health Care; Hospital admissions; Delivery of Health Care.

*RESUMO*

*Objetivo: Analisar as internações hospitalares por condições sensíveis à Atenção Primária à Saúde (APS) no estado de Minas Gerais. Métodos: Estudo ecológico com delineamento de série temporal, de base populacional, realizado no estado de Minas Gerais, acerca da internação hospitalar e as principais causas de internações por condições sensíveis à APS. A análise foi baseada na Autorização de Internação Hospitalar, considerando custos, ano, sexo e faixa etária, de acordo com os dados do Sistema de Informação Hospitalar (SIH). Os microdados foram extraídos do serviço de transferência de arquivos no Departamento de Informática do Sistema Único de Saúde (DATASUS) em junho de 2018. Os registros analisados são referentes ao período de janeiro de 2008 a dezembro de 2017, sendo incluídas todas as internações por condições sensíveis à Atenção Primária à Saúde. Resultados: Evidenciou-se que, no período de 2008 a 2017, as internações sensíveis à atenção primária representaram 21,21% (2.506.782) do total de internações no estado de Minas Gerais, com a região Jequitinhonha, seguida das regiões Nordeste e CentroSul, contribuindo com os maiores percentuais. Com relação às causas, a maior prevalência se concentra em doenças do aparelho circulatório 54,22% (816.617), seguida pelas doenças do aparelho respiratório 43,48% (586.809), doenças endócrinas*

85,70% (325.082), doenças geniturinárias 37,13% (309.281) e doenças infecciosas e parasitárias 38,37% (266.294). **Conclusão:** As internações hospitalares por condições sensíveis à Atenção Primária à Saúde no estado de Minas Gerais seguem o padrão nacional. Embora as internações estejam decrescendo, ainda representam mais de 20% do total de internações realizadas.

**Descritores:** Atenção Primária à Saúde; Hospitalização; Assistência à Saúde.

**RESUMEN**

**Objetivo:** Analizar los ingresos hospitalarios por condiciones sensibles de la Atención Primaria de Salud (APS) del estado de Minas Gerais. **Métodos:** Estudio ecológico de delineamiento de serie temporal, de base poblacional realizado en el estado de Minas Gerais sobre el ingreso hospitalario y las principales causas de ingreso por condiciones sensibles de la APS. El análisis está basado en el Permiso de Ingreso Hospitalario considerando los costes, el año, el sexo y la franja de edad, según los datos del Sistema de Información Hospitalario (SIH). Se han identificado los micros datos del servicio de transferencia de archivos del Departamento Informático del Sistema Único de Salud (DATASUS) en junio de 2018. Los registros analizados son del período entre enero de 2008 y diciembre de 2017 y se han incluido todos los ingresos por condiciones sensibles de la Atención Primaria de Salud. **Resultados:** Se ha evidenciado que en el período entre 2008 y 2017 los ingresos sensibles de la atención primaria han representado el 21,21% (2.506.782) del total de ingresos del estado de Minas Gerais, con la región de Jequitinhonha, seguida de las regiones Noreste y CentroSur contribuyendo con los mayores porcentajes. Respecto las causas, la mayor prevalencia está en las enfermedades del aparato circulatorio con el 54,22% (816.617), seguido de las enfermedades del aparato respiratorio con el 43,48% (586.809), las enfermedades endócrinas con el 85,70% (325.082), las enfermedades genitourinarias con el 37,13% (309.281) y las enfermedades infecciosas y parasitarias con el 38,37% (266.294). **Conclusión:** Los ingresos hospitalarios por condiciones sensibles de la Atención Primaria de Salud del estado de Minas Gerais siguen el patrón nacional. Aunque los ingresos disminuyen aún representan más del 20% del total de ingresos realizados.

**Descriptores:** Atención Primaria de Salud; Hospitalización; Prestación de Atención de Salud.

## INTRODUCTION

Brazil's Unified Health System (*Sistema Único de Saúde - SUS*) is geared to meet the health needs of the population, to develop actions and services that ensure acute care, and those that require certain continuity, which still counts, with disease prevention and health promotion actions[1].

Primary Health Care (*Atenção Primária à Saúde - APS*) has been expanding in Brazil since its creation, precisely because it allows this coverage for the population. New programs and strategies are being created attempting to minimize the problems, so it is important to include the population in the SUS [2,3].

The aspects treated in APS are constantly advancing. After all, they need to keep up with current needs, especially in issues that aim to prevent diseases that can lead to death and promote health, especially concerning diseases that can be prevented when actions are taken to guide and educate users[2].

The National Primary Care Policy (*Política Nacional de Atenção Básica - PNAB*) emphasizes the importance of offering and organizing these APS actions and services so that it is possible to better and widely guarantee full access to health. In 2011, PNAB induced revisions of guidelines for Primary Care (*Atenção Básica à Saúde - ABS*), highlighting the provision of extra resources for services that create new teams[2,4].

The evaluation of health indicators is important to present the current scenario and health actions, enabling new perspectives and better health planning, as they direct the construction of new perspectives and more qualified actions to meet the specific needs of each region[5].

These data are references to SUS management, which aims to improve these indicators and the levels of health care for the population, reduce risks, and improve quality of life. For this, it is important to consider diversity, mobility, and different subjects, among other essential characteristics for determining these indicators[6].

Among hospital morbidities, it is interesting to highlight hospital admissions for sensitive conditions to primary care (ICSAP), since they can be treated timely and effectively in basic health units, without the need for hospital admissions[7]. Understanding that ICSAPs are events that can be avoided using preventive interventions performed in primary care, reducing the problems caused to patients. Therefore, these hospital admissions suit to assume how are the access, coverage, quality, and performance of primary care, as well as their role as organizer of health care networks[8].

In Brazil, the list of ICSAP includes 19 causes of hospital admissions and diagnoses according to the tenth revision of the International Classification of diseases and causes of death (ICD-10). Therefore, studies have been

developed describing the general profile of hospital admissions or prevalence of ICSAP using secondary data, to portray the capacity and resolution of APS in the context of health care networks[9].

Therefore, this study is justified because of the reform of the national primary care policy and the need to evaluate the actions of primary health care, seeking to reduce costs in hospital services due to sensitive causes to this level of care, in addition to assisting in the identification of possible focuses of action for health promotion. Given this, it is questioned how is the occurrence of hospital admissions for sensitive conditions to primary care and what is its impact on the budgetary costs of the state of Minas Gerais, as well as on its health macro-regions. Thus, the present study aims to analyze hospital admissions for sensitive conditions to primary care in the state of Minas Gerais.

## METHODS

This is an ecological study, with a time series design, using secondary microdata referring to hospital admissions for sensitive conditions to primary care (ICSAP) of inhabitants in Minas Gerais, Brazil.

The state of Minas Gerais has a population of 19,597,330[6], considering the Master Plan for Regionalization of Health in Minas Gerais (PDR/MG), it is stratified in 13 expanded health regions, namely: 3101 South; 3102 South Center; 3103 Midwest; 3104 Jequitinhonha; 3105 West; 3106 East; 3107 Southeast; 3108 North; 3109 Northwest; 3110 South East; 3111 Northeast; 3112 Southern Triangle; 3113; Northern Triangle[10].

Data on hospital morbidity were collected according to the International Classification of Diseases (ICD-10), identifying the main causes of ICSAP, using hospital admissions of inhabitants in the state of Minas Gerais, Brazil, as the unit of analysis.

Secondary microdata relating to hospital admissions from the SUS Hospital Information System were used (SIH/SUS), having as a basic instrument the Hospital Admission Authorization (AIH), inserted in the period between 2008 to 2017, in which all the care provided by hospital admissions financed by SUS were obtained.

As a selection criterion, all hospital admissions by place of residence, which took place between 2008 and 2017, whose basic cause was part of one of these groups were considered: diseases preventable by immunization; infectious gastroenteritis and complications; anemia; nutritional deficiencies; ear, nose and throat infections; bacterial pneumonias; lung diseases; hypertension; asthma; angina; cardiac insufficiency; cerebrovascular diseases; diabetes mellitus; epilepsies; kidney and urinary tract infection; skin and subcutaneous tissue infection; inflammatory diseases in female pelvic organs; gastrointestinal ulcer, and diseases related to prenatal and childbirth[8].

Hospital admissions outside Brazil's Unified Health System were not counted, as private hospitalizations paid directly by the patient or by the supplementary health system (health insurance and agreements), and, therefore, not registered by the SIH.

SIH / SUS records more than 85% of hospital admission of people seeking public and private hospitals registered with SUS and includes 92.3% of health units in Brazil.

In June 2018, microdata were extracted from the file transfer service provided by DATASUS (*website*: www.datasus.gov.br). For data consultation, the programs TabNet and TabWin were used. Data collection was carried out with two independent researchers to identify possible discrepancies.

For this study, information corresponding to the date of admission of the patient to the hospital unit by place of residence was used. In this case, it was the state of Minas Gerais. The data obtained represent one hundred percent of the cases that were correctly reported and fed at SIH / SUS.

The descriptive statistical analysis was based on the AIH, according to cost, year, sex, and age group, considering the sensitive causes to APS in the global context of hospital admissions.

The present study involves only the description and analysis of secondary population data, obtained by the general population census, collected from the Mortality Information System, and hospital admissions, informed by the SIH/SUS. All of these information sources are in the public domain, thus exempting the appraisal by an ethics committee in research with human beings. There is no additional information that was not freely accessible and, in particular, no personally identifiable information was obtained for the study.

## RESULTS

From January 2008 to December 2017, 11,819,746 hospital admissions were carried out in public health services in the state of Minas Gerais. Of these, 21.21% (2,506,782) are hospital admissions for sensitive conditions to primary care (ICSAP), with an average of 20 hospital admissions per month.

The financial value of hospital admissions for sensitive conditions to primary care corresponded to 17.24% of the total costs of hospital admissions, and those that demanded more costs were also diseases of the circulatory system (45.39%; R$ 1,408,927,884.90), followed by respiratory diseases (35.06%; R$ 504,416,798.24) and endocrine diseases (79,83%; R$ 174,093,233.99). Although diseases of the genitourinary system had a higher number of hospital admissions than infectious and parasitic diseases (11.94%; R $ 132,048,075.35), infectious diseases had a higher cost than those (Table I).

Table I - Hospital admissions by the Brazil's Unified Health System according to the chapters of ICD-10 in the state of Minas Gerais, Brazil, 2008 to 2017.

| Chapter | Morbidities | ICSAP | % | No ICSAP | % |
|---|---|---|---|---|---|
| I | Some infectious and parasitic diseases | 266,294 | 38.37 | 427,651 | 61.63 |
| II | Neoplasms | - | - | 736,602 | 100.00 |
| III | Blood and hematopoietic organ diseases and certain immune disorders | 14,021 | 12.87 | 94,963 | 87.13 |
| IV | Endocrine, nutritional and metabolic diseases | 325,082 | 85.70 | 54,229 | 14.30 |
| V | Mental and behavioral disorders | - | - | 332,639 | 100.00 |
| VI | Nervous system diseases | 78,027 | 36.65 | 134,851 | 63.35 |
| VII | Eye diseases and appendages | - | - | 91,492 | 100.00 |
| VIII | Diseases of the ear and mastoid process | 2,056 | 13.49 | 13,188 | 86.51 |
| IX | Diseases of the circulatory system | 816,617 | 54.22 | 689,623 | 45.78 |
| X | Respiratory system diseases | 586,809 | 43.48 | 762,751 | 56.52 |
| XI | Diseases of the digestive system | 43,054 | 3.91 | 1,058,458 | 96.09 |
| XII | skin and subcutaneous tissue Diseases | 44,228 | 22.14 | 155,571 | 77.86 |
| XIII | Osteomuscular and connective tissue disease | - | - | 252,561 | 100.00 |
| XIV | Diseases of the genitourinary system | 309,281 | 37.13 | 523,690 | 62.87 |
| XV | Pregnancy, childbirth and the puerperium | 21,047 | 0.97 | 2,144,658 | 99.03 |
| XVI | Some conditions originating in the perinatal period | 266 | 0.11 | 237,185 | 99.89 |
| XVII | Congenital malformations, deformities and chromosomal abnormalities | - | - | 72,042 | 100.00 |
| XVIII | Symptoms, signs and abnormal findings from clinical and laboratory tests, not elsewhere classified | - | - | 155,932 | 100.00 |
| XIX | Injuries, poisonings and some other consequences of external causes | - | - | 1,144,384 | 100.00 |
| XX | External causes of morbidity and mortality | - | - | 2,873 | 100.00 |
| XXI | Factors that influence health status and contact with health services | - | - | 227,619 | 100.00 |
| XXII | Codes for special purposes | - | - | 02 | 100.00 |
| | **Total** | **2,506,782** | **21.21** | **9,312,964** | **78.79** |

Source: Hospital Information System of Brazil's Unified Health System (SIH / SUS). Data from the Computer Department of Brazil's Unified Health System (DATASUS - www.datasus.gov.br). Ministry of Health. Brazil
ICSAP: Hospitalizations for Sensitive Conditions to Primary Care

Of the patients with the highest prevalence of ICSAP, 52% (1,304,059) are women and 46.4% (1,163,763) aged 60 years or over (Table II).

Table II - Value of hospitalizations for Sensitive conditions to primary care by the Unified Health System according to the chapters of ICD-10 in the state of Minas Gerais, Brazil, 2008 to 2017.

| Chapter | Morbidities | ICSAP | | No ICSAP | |
|---|---|---|---|---|---|
| | | Value | % | Value | % |
| I | Some infectious and parasitic diseases | R$ 132,048,075.35 | 11.94 | R$ 974,102,661.28 | 88.06 |
| II | Neoplasms | - | 0.00 | 1,338,011,555.34 | 100.0 |
| III | Blood and hematopoietic organ diseases and certain immune disorders | R$ 5,040,037.99 | 7.70 | R$ 60,419,465.50 | 92.30 |
| IV | Endocrine, nutritional and metabolic diseases | R$ 174,093,233.99 | 79.83 | R$ 43,973,356.40 | 20.17 |
| V | Mental and behavioral disorders | - | - | R$ 336,802,926.97 | 100.0 |
| VI | Nervous system diseases | R$ 52,203,412.89 | 18.76 | R$ 226,118,375.89 | 81.24 |
| VII | Eye diseases and appendages | | 0.00 | R$ 96,554,876.02 | 100.0 |
| VIII | Diseases of the ear and mastoid process | R$ 573,697.08 | 1.43 | R$ 39,536,442.62 | 98.57 |
| IX | Diseases of the circulatory system | R$ 1,408,927,884.90 | 45.39 | R$ 1,695,073,336.75 | 54.61 |
| X | Respiratory system diseases | R$ 504,416,798.24 | 35.06 | R$ 934,200,979.82 | 64.94 |
| XI | Diseases of the digestive system | R$ 38,840,746.45 | 3.93 | R$ 949,274,815.40 | 96.07 |
| XII | skin and subcutaneous tissue Diseases | R$ 24,662,242.29 | 17.87 | R$ 113,374,132.55 | 82.13 |
| XIII | Osteomuscular and connective tissue disease | - | 0.00 | R$ 419,881,239.90 | 100.0 |
| XIV | Diseases of the genitourinary system | R$ 105,763,344.25 | 15.91 | R$ 558,893,480.53 | 84.09 |
| XV | Pregnancy, childbirth and the puerperium | R$ 3,842,541.90 | 0.29 | R$ 1,299,379,817.25 | 99.71 |
| XVI | Some conditions originating in the perinatal period | R$ 277,553.38 | 0.04 | R$ 774,833,098.30 | 99.96 |
| XVII | Congenital malformations, deformities and chromosomal abnormalities | - | 0.00 | R$ 230,047,139.95 | 100.0 |
| XVIII | Symptoms, signs and abnormal findings from clinical and laboratory tests, not elsewhere classified | - | 0,00 | R$ 142,062,458.49 | 100.0 |
| XIX | Injuries, poisonings and some other consequences of external causes | - | 0.00 | R$ 1,412,470,245.90 | 100.0 |
| XX | External causes of morbidity and mortality | - | 0.00 | R$ 2,597,984.52 | 100.0 |
| XXI | Factors that influence health status and contact with health services | - | 0.00 | R$ 118,976,795.71 | 100.0 |
| XXII | Codes for special purposes | - | 0.00 | R$ 573.92 | 100.0 |
| | **Total** | **R$ 2,450,689,568.71** | **17.24** | **R$11,766,585,759.01** | **82.76** |

Source: Hospital Information System of Brazil's Unified Health System (SIH / SUS). Data from the Informatics Department of Brazil's Unified Health System (DATASUS - www.datasus.gov.br). Ministry of Health. Brazil
ICSAP: Hospitalizations for Sensitive conditions to Primary Care

Regarding the origin of patients hospitalized by health macro-regions in the state of Minas Gerais, the difference between regional scenarios was observed from the perspective of the ICSAP, but it was not possible to visualize it at the municipal level. The highest rates of ICSAP were found in the Jequitinhonha (30.32%; 64,318) and Northeast (30.70%; 165,336) Macroregions, both with a percentage greater than 30% of ICSAP compared to the overall total of hospital admissions in the period (Table III). Safeguarding the appropriate proportions, this percentage is higher than that reached by Minas Gerais, which obtained, in the same period, 21.21% (2,506,782) of ICSAP (Table IV).

The main causes of these hospital admissions were related to diseases of the circulatory system (54.22%; 816,617), diseases of the respiratory system (43.48%; 586,809), endocrine diseases (85.70%; 325,082), genitourinary diseases (37.13%; 309,281) and infectious and parasitic diseases (38.37%; 266,294), respectively, as shown in Table I.

Table III - Distribution of hospitalizations by the public health system of residents in the Health Macro-regions of the state of Minas Gerais, Brazil, 2008 to 2017.

| Expanded Health Region | ICSAP | % | No ICSAP | % |
|---|---|---|---|---|
| 3101 South | 369,028 | 22.02 | 1,306,640 | 77.98 |
| 3102 South Center | 121,648 | 25.42 | 356,975 | 74.58 |
| 3103 Center | 578,003 | 17.24 | 2,774,875 | 82.76 |
| 3104 Jequitinhonha | 64,318 | 30.32 | 147,832 | 69.68 |
| 3105 West | 134,077 | 20.71 | 513,184 | 79.29 |
| 3106 East | 204,807 | 23.32 | 673,483 | 76.68 |
| 3107 Southeast | 303,131 | 24.56 | 931,062 | 75.44 |
| 3108 North | 197,698 | 20.22 | 779,906 | 79.78 |
| 3109 Northwest | 61,45 | 20.27 | 243,647 | 79.73 |
| 3110 South East | 86,869 | 20.77 | 331,304 | 79.23 |
| 3111 Northeast | 165,336 | 30.07 | 384,550 | 69.93 |
| 3112 Southern Triangle | 91,668 | 23.08 | 305,493 | 76.92 |
| 3113 Northern Triangle | 128,254 | 18.53 | 564,013 | 81.47 |
| **Total** | **2,506,782** | **21.21** | **9,312,964** | **78.79** |

Source: Hospital Information System of Brazil's Unified Health System (SIH / SUS), Data from the Informatics Department of Brazil's Unified Health System (DATASUS - www,datasus,gov,br), Ministry of Health, Brazil
ICSAP: Hospitalizations for Sensitive conditions to Primary Care

Table IV - Distribution of the five most frequent causes of hospitalizations, by age group, by the Brazil's Unified Health System, by sensitive conditions to primary care, according to the chapters of ICD-10 in the state of Minas Gerais, Brazil, 2008 to 2017,

| Age range | | ICSAP | Total | Rate (%) |
|---|---|---|---|---|
| **Under 1 year** | 1ª | Lung diseases | 33,848 | 25.38 |
| | 2ª | Infectious gastroenteritis and complications | 25,839 | 19.38 |
| | 3ª | Bacterial pneumonia | 24,238 | 18.18 |
| | 4ª | Asthma | 16,578 | 12.43 |
| | 5ª | Kidney and urinary tract infection | 11,556 | 8.67 |
| | | Other causes (ICSAP) | | 15.96 |
| 1 to 13 years | 1ª | Infectious gastroenteritis and complications | 104,383 | 33.63 |
| | 2ª | Asthma | 57,133 | 18.41 |
| | 3ª | Bacterial pneumonia | 56,272 | 18.13 |
| | 4ª | Kidney and urinary tract infection | 21,156 | 6.82 |
| | 5ª | Epilepsies | 17,307 | 5.58 |
| | | Other causes (ICSAP) | 54,140 | 17.44 |
| 14 to 19 years | 1ª | Kidney and urinary tract infection | 24,826 | 36.82 |
| | 2ª | Infectious gastroenteritis and complications | 10,339 | 15.33 |
| | 3ª | Prenatal and delivery related illness | 6,274 | 9.30 |
| | 4ª | Bacterial pneumonia | 4,081 | 6.05 |
| | 5ª | Diabetes mellitus | 4,011 | 5.95 |
| | | Other causes (ICSAP) | 17,903 | 26.55 |
| 20 to 39 years | 1ª | Kidney and urinary tract infection | 81,000 | 28.01 |
| | 2ª | Infectious gastroenteritis and complications | 34,170 | 11.82 |
| | 3ª | Inflammatory disease of female pelvic organs | 21,944 | 7.59 |
| | 4ª | Bacterial pneumonia | 18,143 | 6.27 |
| | 5ª | Diabetes Mellitus | 17,223 | 5.96 |
| | | Other causes (ICSAP) | 116,701 | 40.36 |
| 40 to 59 years | 1ª | Cardiac insufficiency | 85,485 | 15.75 |
| | 2ª | Angina | 66,120 | 12.18 |
| | 3ª | Cerebrovascular diseases | 61,028 | 11.25 |
| | 4ª | Kidney and urinary tract infection | 51,842 | 9.55 |
| | 5ª | Diabetes mellitus | 50,522 | 9.31 |
| | | Other causes (ICSAP) | 227,668 | 41.95 |
| 60 years and over | 1ª | Cardiac insufficiency | 269,893 | 23.19 |
| | 2ª | Cerebrovascular diseases | 164,102 | 14.10 |
| | 3ª | Lung diseases | 128,251 | 11.02 |
| | 4ª | Angina | 99,610 | 8.56 |
| | 5ª | Kidney and urinary tract infection | 86,811 | 7.46 |
| | | Other causes (ICSAP | 415,096 | 35.67 |
| | | **Total** | **2,506,782** | |

Source: Hospital Information System of Brazil's Unified Health System (SIH / SUS), Data from the Informatics Department of Brazil's Unified Health System (DATASUS - www,datasus,gov,br), Ministry of Health, Brazil
ICSAP: Hospitalizations for Sensitive conditions to Primary Care

Table V - Distribution of the most frequent causes, by sex, of admissions to the Unified Health System for Sensitive conditions to primary care, according to the chapters of ICD-10 in the state of Minas Gerais, Brazil, 2008 to 2017.

| Sensitive Condition to Primary Care | Minas Gerais | | | |
|---|---|---|---|---|
| | Total | % total | % Male | % Female |
| 1, Diseases preventable by immunization | 21,108 | 0.84 | 67.42 | 32.58 |
| 2, Infectious gastroenteritis and complications | 286,131 | 11.41 | 49.16 | 50.84 |
| 3, Anemia | 14,021 | 0.56 | 42.60 | 57.40 |
| 4, Nutritional deficiencies | 87,640 | 3.50 | 56.71 | 43.29 |
| 5, Ear, nose and throat infections | 24,079 | 0.96 | 51.86 | 48.14 |
| 6, Bacterial pneumonia | 220,605 | 8.80 | 52.06 | 47.94 |
| 7, Asthma | 113,218 | 4.52 | 50.79 | 49.21 |
| 8, Lung diseases | 211,963 | 8.46 | 54.94 | 45.06 |
| 9, Hypertension | 65,134 | 2.60 | 40.22 | 59.78 |
| 10, Angina | 171,977 | 6.86 | 57.09 | 42.91 |
| 11, Heart failure | 374,444 | 14.94 | 49.04 | 50.96 |
| 12, Cerebrovascular diseases | 238,084 | 9.50 | 51.61 | 48.39 |
| 13, Diabetes mellitus | 155,299 | 6.20 | 44.28 | 55.72 |
| 14, Epilepsies | 59,820 | 2.39 | 59.99 | 40.01 |
| 15, Kidney and urinary tract infection | 277,191 | 11.06 | 28.78 | 71.22 |
| 16, Infection of the skin and subcutaneous tissue | 85,691 | 3.42 | 53.22 | 46.78 |
| 17, Inflammatory disease of female pelvic organs | 32,090 | 1.28 | - | 100.00 |
| 18, Gastrointestinal ulcer | 43,054 | 1.72 | 64.57 | 35.43 |
| 19, Diseases related to prenatal care and childbirth | 25,233 | 1.01 | 8.48 | 91.52 |
| **Total** | **2,506,782** | **100.0** | **47.98** | **52.02** |

Source: Hospital Information System of Brazil's Unified Health System (SIH / SUS), Data from the Informatics Department of Brazil's Unified Health System (DATASUS Datasus- www,datasus,gov,br), Ministry of Health, Brazil
ICSAP: Hospital admissions for Sensitive Conditions to Primary Care,

Regarding gender, heart failure (14.94; 374,444) stands out, followed by infectious gastroenteritis (11.41%; 286,131) and infections in the kidney and urinary tract (11.06%; 277,191), and, as well as in the general context of the most frequent causes, the above cited pathologies were more present in women (Table V).

Considering the most frequent causes by age group, it is possible to observe that, in children under one-year-old; lung diseases, infectious gastroenteritis, and bacterial pneumonia assume more than 60% (83,925) of the causes of ICSAP. From 1 to 13 years old, infectious gastroenteritis and complications, asthma, and bacterial pneumonia account for more than 70% (217,788) of the causes of ICSAP. From 14 to 39 years old, kidney and urinary tract infections and infectious gastroenteritis and complications account for more than 80% (116,165) of the causes of ICSAP. Finally, in the population over 40 years old, heart failure represented almost 35% (355,378) of the causes of ICSAP (Table V).

## DISCUSSION

The percentage of hospital admissions for sensitive conditions to primary care (ICSAP) in the last ten years, in the state of Minas Gerais, corresponds to 21.21% of the general scenario of hospital admissions performed in the period by SUS. Although this percentage is significant for the hospital admissions scenario in the state, ICSAPs have been decreasing over the years in the Brazilian health scenario[12].

The reduction in the number of hospital admissions may be a consequence of the changes that have been happening in APS, because, when the services implement new prevention strategies, they effectively control patients with chronic diseases and assist in the early diagnosis of diseases[13].

Despite the reduction in ICSAP, spending on inpatient services is still significantly high. These expenditures are representative in health services and mainly affect primary care services, so they are important for the development of new policies and new strategies capable of reducing the costs of avoidable hospital admissions[12].

The most sensitive group to hospital admissions is the women, whose chance increases for those with less education, age over 60 years, and who do not constantly use health services, making them a group that deserves extra attention[14].

The current population aging may be one of the reasons for the higher prevalence in people over the age of 60 years, as this causes an overload in services for the public in this age group. Thus, the number of ICSAP also increases at this age, with diseases mainly related to the cardiovascular and respiratory systems[15].

The number of hospital admissions in the age group under 13 was not representative in the present study, but other studies reveal that children under five are also more vulnerable to ICSAPs. This occurs not only in Brazil but also in countries like Australia and England[9,16].

The reductions that have been presented in the numbers of ICSAP is the representation of the health system organization, however, unfortunately, these numbers do not decrease further because the services still find it difficult to work in full, which prevents the decrease in occurrences inpatient[17].

The British National System, from 2001 to 2011, showed an increase in ICSAP[16]. A study conducted by the Inter-American Development Bank (IDB) on preventable hospital admissions and strengthening primary care, using secondary data in six Latin American countries (Argentina, Colombia, Costa Rica, Ecuador, Mexico, and Paraguay), evaluated 39 million hospital admissions. The results classified as ICSAP 14.3% of hospital admissions, and the average rate ranged from 10.8% (Costa Rica) to 21.6% (Colombia)[18].

In Brazil, despite the reduction in the number of cases, in 2010, hospital admissions for sensitive conditions to primary care accounted for 22.5% of hospital admissions in public health services[19].

The differences observed between the rates of hospital admissions in the microregions are due to services that are offered in each of them, that is, if the region has primary care coverage and, even so, the number of ISCAP cases has not decreased, suggesting inadequacies in the care model and problems in the quality of care[20].

Among the main causes of hospital admissions are cardiovascular diseases, lung diseases, infectious gastroenteritis and complications, kidney and urinary tract infections. Being the diseases of the circulatory system, such as heart failure, angina, and cerebrovascular diseases, the most prevalent in the age group over 60 years[21].

Hospital admissions due to circulatory system diseases among elderly Brazilians are responsible for almost 40% of all expenses with hospital admissions, as some of these diseases require long hospital admissions and assistance of high complexity and technology. Besides, the diseases that affect this age group are, in large part, chronic diseases, which require a higher quality of monitoring, which also increases the expenses for SUS[22,23].

Few studies are carried out from the perspective of spending on ICSAP, therefore, although the reduction in the percentage of total spending on ISCAP has been identified over the years in the health microregions of Brazil, this reduction is still insignificant, showing the need for intensifying specific actions[24].

Thus, we can take into account that, for the state of Minas Gerais to have lower expenses with hospital admissions, it is important to determine where and how it should change its services, acting in the development of health actions that go beyond the curative model and build models of care focused on prevention and health promotion[25].

For this to happen, it may be important that professionals in APS are guided about the importance of health promotion, as some are still unaware of it, which demonstrates the need for discussions on the subject[26]. Thus, by offering new knowledge to professionals, it will be possible to improve the services offered to the population and reduce expenses with preventable hospital admissions[27].

In addition, the decrease in spending on ICSAP could favor the investment capacity of the state of Minas Gerais also from the improvement in efficiency in the use of financial resources, which is the primary responsibility of public management. ICSAP can be induced by several causes, the most common being kidney and urinary tract infections, bacterial pneumonia and heart failure, infectious gastroenteritis and complications, chronic diseases, diabetes mellitus, arterial hypertension, skin and subcutaneous infections, and heart failure[13,20,28].

It is worth mentioning that many of these causes can and should be observed with care in primary care, therefore, each region must analyze its socioeconomic conditions and its service network to define which strategies should be carried out[28].

It is possible to observe that data from Minas Gerais diverge somewhat from national data, initially because diseases of the circulatory system have the highest percentage among ICSAP, as well as endocrine and genitourinary diseases, the results for diseases of the respiratory system are slightly different, with national results even higher than those of the state.

Among the regions of Minas Gerais responsible for the highest numbers of ICSAP, we found Jequitinhonha region. This occurs because APS in the region is not being effective in the assistance that has been provided. One study showed the inefficiency of health promotion services and comprehensive care, making it difficult to contribute to the expansion and quality of health services[29].

Initially, to understand the reason for this result, we sought to identify the typology of the macroregions, taking into account the socioeconomic development (SED) and the offer of health services (OSS). Through these parameters, the persistence of regional inequalities in the state of Minas Gerais was evidenced. In the case of the Jequitinhonha and Northeast macroregions, both stand out with low percentages of socioeconomic development and, consequently, less concentration of services, equipment, and specialized human resources[30].

Population parameters are important to guide managers in planning and prioritizing the actions that should be involved, considering the number of inhabitants, epidemiological demographic and factors, and the human, technological and financial resources available[31,32]. Based on the National Primary Care Policy (PNAB), the degree of vulnerability will define the number of people per team[33].

To meet the specific demands of each macro-region, the systems rely on resolvability, which is the ability to solve the health and disease relationships of users to serve them properly, regardless of the level of care[34]. A resolvability study carried out based on the performance of hospital services provided by level of care, in 2010, revealed that Macro Northeast showed resolvability below 40%, while Jequitinhonha presented resolvability only 28%[35].

A study carried out with a focus on solving health macro-regions demonstrated that the largest portion of areas lacking services is found in the northern part of the state, where are the Northeast, Jequitinhonha, and Northwest macros. In the same study, the author states that inhabitants of the Jequitinhonha macro are assisted in other locations, and the ratio of procedures performed per inhabitant (0.00222) is close to that observed in the Northeast macro (0.00252)[10].

It is important to propose a health system organization that jointly considers attention to acute conditions (usually short-term, responded to by a reactive system and episodic actions) and chronic conditions (longer-term, demanding of a proactive, continuous, and integrated response system)[36].

Still, it is highlighted that strong primary care, along the lines of the Family Health Strategy, emerges as one of the possibilities for breaking this gap between the analysis of the population's health conditions and the organization of health systems, highlighting the efficiency and effectiveness of its capacity to respond to the real health needs of the population[36].

The 2011 PNAB reinforces the importance of strengthening the Family Health Strategy to achieve greater resolution in primary care, capable of increasing coverage, promoting comprehensive care, and developing health promotion, becoming the gateway to health. Brazil's Unified Health System, significantly contribute to APS exercising its role as coordinator and organizer of Health Care Networks[33,37].

Because of this, the present study allowed us to observe the occurrence of ICSAP in the period from 2008 to 2017 and understand that, although this percentage is decreasing, it still represents more than 20% of the total hospital admissions performed. Regarding the financial impact of these hospital admissions in the state of Minas Gerais, these expenses are relevant and could be redirected to expand and strengthen the APS.

Thus, the result of the APS, or the resolution, as it is in this work described, refers to the fulfillment of the APS role by all its actors, to the detriment of the disjointed services, which are prioritized in the municipalities and reflected in these ICSAP indexes. Despite the complexity of assessing the resolution capacity of primary health care and/or accessibility to its services, because of the results found, the analysis of ICSAP in the context of the state of Minas Gerais is ratified as an indicator that reveals essential aspects the organization of that point in the system. There is a clear need to continue studies on this topic so that they serve as a basis for improving APS services and to induce change in the models of health care practiced in the state of Minas Gerais and Brazil, and also for reflexes of these advances can be measured in the consolidation of a more equitable health policy for the user and for the system itself, which today is in crisis.

The study has limitations inherent to research with secondary data, possible underreporting, and concerning the validity of identifying the basic cause of hospital admissions. Limitations have been reduced through rigorous quality analyzes and specific searches aimed at reducing total biases.

## CONCLUSION

Hospital admissions for sensitive conditions to Primary Care in the state of Minas Gerais follow the national standard, although hospital admissions are decreasing still represents more than 20% of the total admissions performed. The highest prevalence of hospital admissions was among women, over the age of 60 years, the main causes being diseases of the circulatory system, diseases of the respiratory system, endocrine diseases, genitourinary diseases, and infectious and parasitic diseases, occurring mostly in the Macro-regions of Jequitinhonha and Northeast.

## CONFLICTS OF INTEREST

There are no conflicts of interest on the part of the authors.

## CONTRIBUTIONS

**Karina Gama dos Santos Sales**, **Luiz Carlos de Abreu** and **Italla Maria Pinheiro Bezerra** contributed to the preparation and design of the study, acquisition analysis, data interpretation and writing the manuscript; **José Lucas Souza Ramos** contributed to the acquisition analysis, interpretation of data.

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