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Avoidable hospitalizations of the elderly in the state of Ceará: a descriptive ecological study

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Abstract

Studies that evaluate Hospitalizations due to Primary Care-sensitive Conditions (HPCSC) are relevant in the field of health, as they refer to indicators of hospital care that represent an indirect measurement of the effect of Primary Health Care (PHC), based on the premise that good quality PHC prevents/reduces hospitalizations among the elderly population. This article aimed to describe the behavior of HPCSC in elderly people aged 60 to 74 years old in the state of Ceará. This is a descriptive ecological study that analyzed the temporal evolution of annual rates of HPCSC in the elderly in the five health macro-regions of the state of Ceará, from 2008 to 2019. Secondary data regarding hospitalizations and the projection of the resident population for the calculation of rates were extracted, respectively, from the hospital information system and from the demographic database, both contained within the Tabnet of the Department of Informatics of the UHS. In the period from 2008 to 2019, there were 686,906 hospitalizations in the five health macro-regions of the state of Ceará, of which (298,002) were due to sensitive conditions. The highest rate of HPCSC (452.99) occurred in the Cariri macro-region. There was a predominance of elderly men (4,731) aged 70-74 years (5,893) and due to chronic conditions (2,195.3). There was a reduction in hospitalizations due to primary care-sensitive conditions in the period studied, except in the central Sertão region. The decrease in hospitalizations of the elderly in the state of Ceará may be related to a more resolute primary care in the care of the elderly.

Keywords: Elderly Health. Primary Health Care. Hospitalization.

INTRODUCTION

Hospital admissions represent a great risk to the health of the elderly and a high cost to the health system[1,2]. Elderly people are seven times more at risk of Hospitalizations for Primary Care-Sensitive Conditions (HPCSC)[3], which has led to a disproportionate expenditure by the Unified Health System (UHS) in 2011. In that year, Brazil spent 3.3 billion reais on hospitalizations for the elderly in the Unified Health System, equivalent to 30% of the total amount spent to cover 10% of the population[3].

It is observed that in the country, the hospitalization rates by the SUS are high and their costs are higher in people aged 60 years or older[4]. The number of recurrences of hospitalizations in people of this age group is also higher, contributing to the fact that 23% of public expenditures for these hospital admissions are destined for this population segment[5]. Researchers point out that the main causes

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of HPCSC in the elderly population are heart failure, angina, lung diseases, and cerebrovascular diseases[6,7].

In this context, it is worth mentioning that the HPCSC indicator was built from a conceptual framework that correlates the avoidability and reduction of hospitalizations for some health conditions to timely and good quality primary care. This finding implies that care must be resolute and comprehensive, so that hospitalization will be performed in the most severe and rare cases[8].

Furthermore, this indicator is used to verify access to health systems[9], especially the performance and quality of Primary Health Care (PHC), and it is worth noting that there is already an established relationship between the decrease in hospitalization rates of the elderly due to PCSC and the improvement of access, coverage, and quality of basic level health services, which are more significant among the elderly up to 74 years of age[3,10,11,12].

However, geographic variations in avoidable hospitalization rates are determined by the hospitals themselves, which reflect different roles of smaller and rural hospitals compared to the main referral hospitals and need to consider contextual barriers and facilitators which influence access to healthcare. Other factors that can influence HPCSC are related to the socioeconomic context, for example, social determinants of health can be considered external influencers of HPCSC rates, especially those related to education, income, and housing conditions[13].

In view of the above, this study proposes to answer the following questions: What is the behavior of the rates of HPCSC in the elderly in the five macro-regions of the State of Ceará? What are the most prevalent causes of hospitalizations among elderly people admitted for sensitive conditions? It is believed that this study will allow us to understand the behavior of HPCSC in the elderly. Furthermore, it will provide important subsidies for the implementation of equitable public policies and rational allocation of adequate resources to the different realities of the macro-regions of the state of Ceará.

Given this context, the objective of this study was to describe the behavior of Hospitalizations due to Primary Care-Sensitive Conditions (HPCSC) in elderly people aged 60 to 74 years old in the state of Ceará.

METHODS

This is a descriptive ecological study. The time frame that outlined the historical series (2008-2018) was the year following the adhesion of most states in the Northeast region to the "Pacto pela Saúde 2006 - Consolidação do SUS", which took place in 2007[14].

The basis for determining the diagnostic codes of PCSC was the Brazilian List of Sensitive Conditions, published by the Ministry of Health, through Ordinance Nº. 221, of April 17, 2008, which has 74 causes divided into 19 groups[15]. It should be noted that group 19 was excluded from this study because it contained conditions related to prenatal care and childbirth, which are not relevant in this age group. The maximum age of the elderly was limited to 74 years, because above this age group, the high prevalence of comorbidities makes it difficult to analyze the underlying cause of hospitalization, no longer characterizing them as avoidable or sensitive conditions[3,16].

The study was carried out in the state of Ceará, which has 184 municipalities distributed in a territorial unit of approximately 148,888 km², with a population of 8,452,381 inhabitants in 2010, mostly urban (75%), and with a Human Development Index (HDI) of 0.682 (medium)[17].

Considering the Master Plan for Regionalization of Health Actions and Services of the State of Ceará, revised in 2014, the 184 muni-

cipalities of Ceará are grouped into 22 health regions and five health macro-regions (HMR), namely: Fortaleza, Sobral, Cariri, Central Sertão, Litoral Leste/Jaguaribe[18]. Health Regions are defined as continuous geographic spaces constituted by grouped neighboring municipalities, bordered by their cultural, economic, and social identities and from communication networks and shared transport infrastructure, with the purpose of integrating the organization, planning, and execution of health actions and services[19].

In this study, the units of analysis were composed of the five HMR from the state of Ceará that registered in the Hospitalization System (HS/UHS) hospitalizations due to sensitive conditions in elderly people up to 74 years of age, from January 2008 to December 2019, in the network associated with UHS.

Secondary data referring to hospitalizations and the projection of the resident population for the calculation of rates were extracted, respectively, from the Hospital Information System (HIS) and from the demographic database, both contained in the Tabnet of the Department of Informatics of the UHS (DATASUS).

The routine of extracting data on hospitalizations initially involved the selection of the option "General, by place of residence" with geographic coverage "Ceará". Subsequently, the option of "Health Macro-region" was selected for the rows, for the columns "Year of care", for the content "Admissions", and the period "January 2008 to December 2019". In the filter "List of Morbidity CID10", the set of diseases of each of the 18 groups of sensitive conditions belonging to the Brazilian list of sensitive hospitalizations 15, adapted to the tabulation for morbidity of the UHS information system, was selected. These data were broken down by sex and age group (60-64 years old; 65-69 years old; 70-74 years old).

The projection of the resident elderly population was obtained from the DATASUS database called "Demographic and Socioeconomic", and the option "Study of Population Estimates by municipality, sex, and age - 2000-2020" was selected. The rows included information for "Health Macro-regions", for the column it was "Year", and for the content "Resident Population" was selected in the period from 2008 to 2019. These data were broken down by sex and age group and used as a basis for calculating the rate of HPCSC for every 10,000 elderly people.

The variables related to hospitalizations were obtained for each Health Macro-region in the state of Ceará and for each year of the time series and grouped into three blocks: (1) absolute variables; (2) relative variables; and (3) hospitalization rates per 10,000 seniors.

Absolute variables included the number of general hospitalizations, number of non-sensitive (non-PCSC) hospitalizations and number of general HPCSC, and were stratified by sex, age group, cause group (group 1 to 18 of the Brazilian PCSC List), and type of condition; the latter being classified as Preventative (group 1 of the Brazilian List of PCSCs), Acute (group of 2-6 and 15-18 of the Brazilian List of PCSCs), and Chronic (group of 7-14 of the Brazilian List of PCSCs).

The second block included the calculation of the relative participation of non-PCSC and PCSC in relation to general hospitalizations, as well as the relative participation of each of the strata of sensitive hospitalizations, all given in percentage. Subsequently, the non-HPCSC and HPCSC rates were calculated for every 10,000 elderly people, based on the projection of the resident population for each year and the Health Macro-region of interest, and the rates of HPCSC were stratified by sex, age group, group of cause, and type of condition.

Data were analyzed using Excel version 2010. Tables of frequency of hospitalizations and distribution of HPCSC rates were prepared to describe the absolute and relative data. For better representation of the results, bar and trend graphs of HPCSC rates were created. In addition, to analyze the behavior of HPCSC rates in the elderly over the time series in each unit of analysis, the absolute variation - AV (equation 1) and relative variation - RV (equation 2) of the HPCSC rates between 2008 and 2019, for each Health Macro-region in the sta-

te of Ceará:

$$AV = HPCSC\ Rate_{(2019)} - HPCSC\ rate_{(2008)} \quad (1)$$

$$RV = AV / HPCSC\ Rate_{(2019)} \times 100 \quad (2)$$

The first equation describes the variation in percentage ports of the HPCSC rate, while the second describes the percentage of increase or reduction of the same.

RESULTS

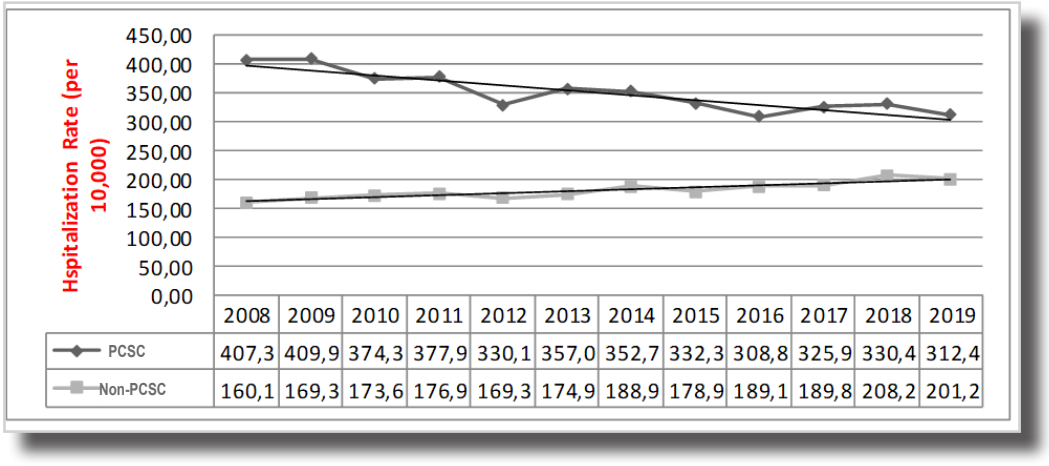
In the period from 2008 to 2019, there were 686,906 hospitalizations in the five health macro-regions of the state of Ceará, of which 298,002 were for sensitive conditions, which is equivalent to 43.38% of all hospitalizations in the elderly up to 74 years of age.

The highest rate of HPCSC (452.99) occurred in the HMR of Cariri, followed by Sobral (380.82), Central Sertão (339.94), Litoral Leste/Jaguaribe (355.17), and Fortaleza (299.66). It is noteworthy that the HMR of Fortaleza had a higher proportion of HPCSC (122,854), while the HMR of Litoral Leste/Jaguaribe (20,337) had the lowest proportion of HPCSC among general hospitalizations. For the HMR of Fortaleza (504.86), East Coast/Jaguaribe (453.96), Cariri (448.4), Central and East Coast/Jaguaribe (453.96) the non-HPCSC rates prevailed. For HMR in Sobral (362.79), and Central Sertão (404.29), the rates of non-HPCSC were lower.

Regarding the annual rates of HPCSC in the state of Ceará, there was a predominance of chronic conditions (2,195.3), followed by acute conditions (1,733.2), and, finally, preventative conditions (29.7). Regarding the groups of causes with the highest rates of HPCSC, in descending order, heart failure (Group 11) stood out, with a rate of 651.2, bacterial pneumonia (group 6) with a rate of 567.2, cerebrovascular diseases (group 12) with a rate of 469.0, skin and subcutaneous tissue infection (group 16) with a rate of 373.1, and angina (group 10) with a rate of 339.1.

Regarding the crude rates of HPCSC in the elderly by group of causes, there was a prevalence in: heart failure (group 11) with a rate of 16.4, bacterial pneumonia (group 6) with a rate of 14.3, and cerebrovascular diseases (group 12) rate of 11.7. The other groups did not show significant gross rates of HPCSC.

The temporal analysis of the HPCSC rate in the state of Ceará revealed a significant reduction between 2008 and 2019. The year 2009 recorded the highest number of HPCSC and the year 2016, the lowest. Regarding non-HPCSC rates, there was an upward trend (figure 1).

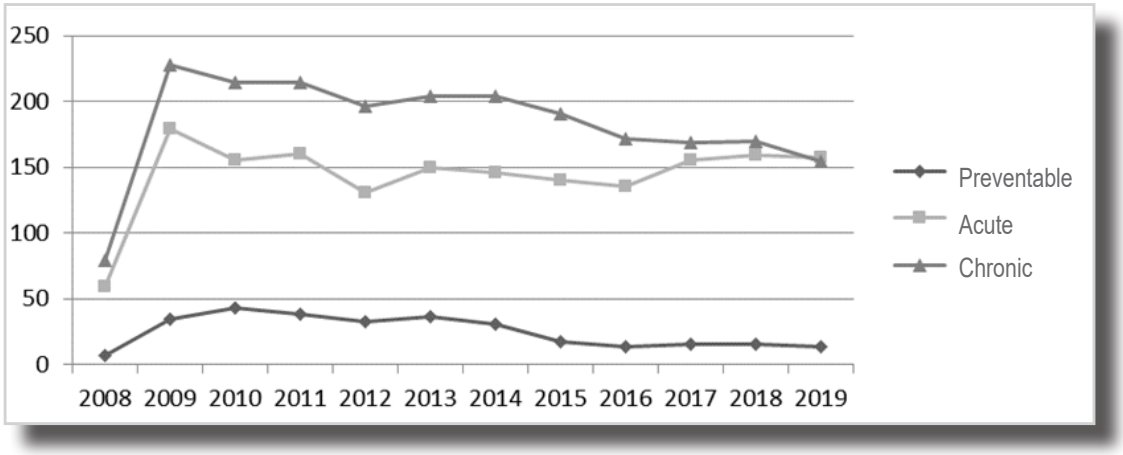


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
PCSC	407,3	409,9	374,3	377,9	330,1	357,0	352,7	332,3	308,8	325,9	330,4	312,4
Non-PCSC	160,1	169,3	173,6	176,9	169,3	174,9	188,9	178,9	189,1	189,8	208,2	201,2

Source: HIS/DATASUS.

Figure 1 – Trend of PCSC and Non-PCSC Hospitalization Rates in elderly residents in the State of Ceará, 2008-2019. Sobral, Ceara, Brazil, 2020.

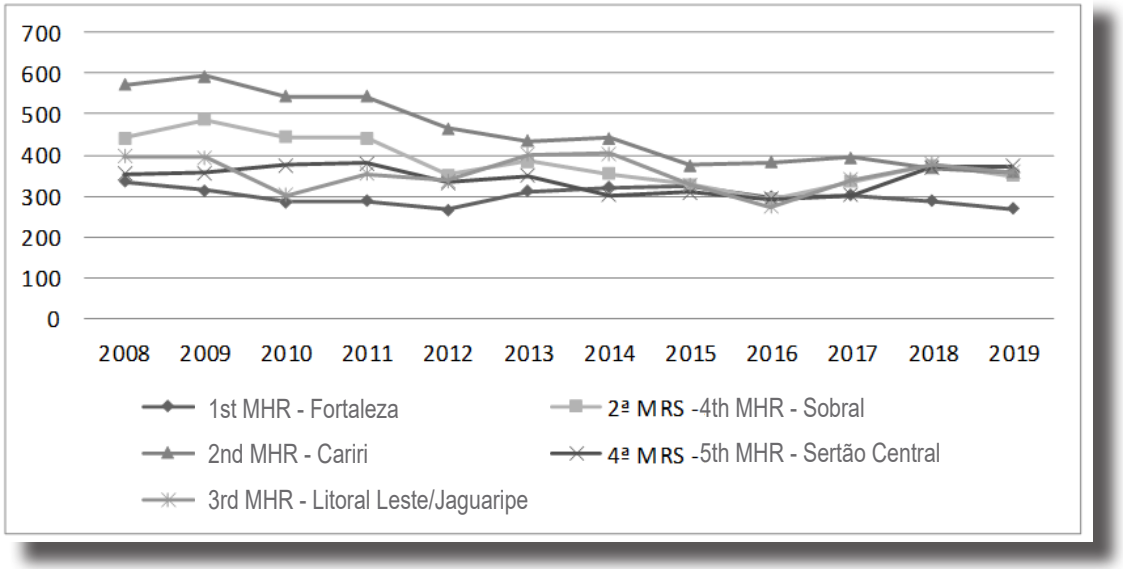
Regarding the trend of HPCSC rates in the elderly by type of condition, it was found that chronic and acute conditions had increased in the year 2008 to 2009; however, there was a reduction in subsequent years. Regarding immunization conditions, the lowest rate occurred in 2008 and the highest in 2010 (figure 2).



Source: HIS/DATASUS.

Figure 2 – Evolution of HPCSC rates over time in the elderly by each type of condition (2008-2019). Sobral, Ceará, Brazil, 2020.

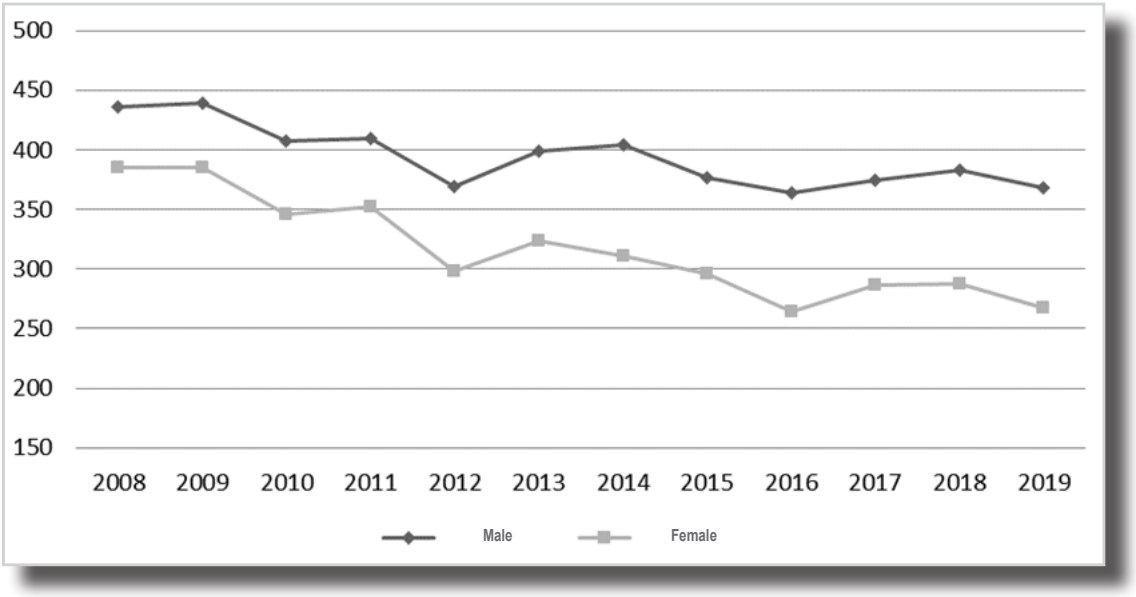
Figure 3 shows the trend behavior of HPCSC rates in the elderly in the 5 macro-regions of the state of Ceará, during the period from 2008 to 2019. There was a reduction in the macro-region of Fortaleza, Sobral, Cariri and Litoral Leste/Juaguaribe. However, only the Central Sertão macro-region showed an increase in HPCSC rates in the elderly.



Source: HIS/DATASUS.

Figure 3 – Trend in HPCSC rates in the elderly in the Health Macro-regions of the State of Ceará (2008-2019). Sobral, Ceará, Brazil, 2020.

Regarding the annual rates of HPCSC in the elderly by sex and age group, the values found were: 4,731 men; 3,803 women; 3,092 elderly people aged 60-64 years; 4,314 65-69 year olds; and 5,893 70-74 year olds. Regarding the trends of HPCSC rates in the elderly according to sex, it was observed that there was a considerable reduction in both males and females (figure 4).



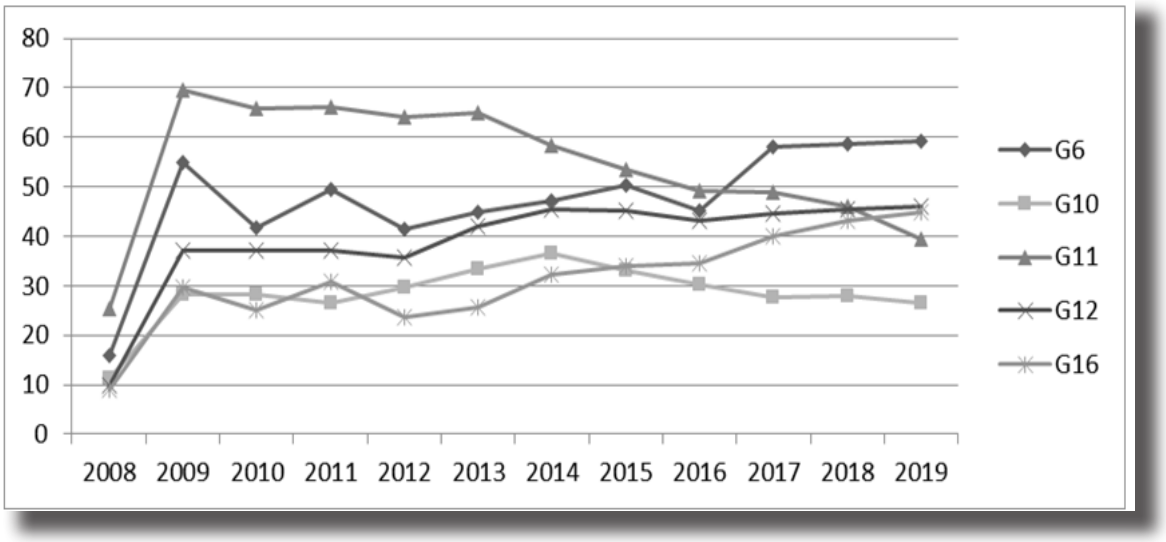
Source: HIS/DATASUS.

Figure 4 – Trend in HPCSC rates in the elderly by sex in Ceará (2008-2019). Sobral, Ceará, Brazil, 2020.

Regarding the trend of HPCSC rates in the elderly by age group, in the period from 2008 to 2019, there was a reduction in rates in all age groups evaluated.

Regarding the trend of the five main groups of causes of HPCSC in the elderly in the state of Ceará identified between 2008 and 2009, there was an increase for all the analyzed causes.

The hospitalization rate due to skin and subcutaneous tissue infection (G16) increased significantly, on the other hand, the hospitalization rate for heart failure (G11) registered a significant reduction. The others had fluctuations in time, but did not show such significant increases, as shown in Figure 5.



Source: HIS/DATASUS.

Figure 5 – Evolution of the five groups of causes over time with the highest rates of HPCSC in the elderly in the state of Ceará (2008-2019). Sobral, Ceará, Brazil, 2020.

Regarding the rate of HPCSC in the elderly in the five macro-regions of the state of Ceará, it was observed that there was a relative increase in the 4th MHR - Sertão Central of 5.57%, and in all the other regions these rates decreased, especially for the 3rd MHR – Cariri, with a reduction of 37.51%; the 2nd MHR – Sobral, with a reduction of 20.90%; the 1st MHR – Fortaleza, with a reduction of 19.87%; and the 5th HMR- Litoral Leste/ Jaguaribe by 9.58%.

DISCUSSION

The data show the relevance of knowing the profile of HPCSC at the state level, since they make it possible to study the panorama and evolution of these hospitalizations in the elderly, and thus contribute as an additional tool for health planning and management within the UHS, because in the analysis of the macro-regions, different scenarios were observed regarding the rates of HPCSC, which facilitates directing efforts in actions and strategies.

It is worth noting that, in addition to the observation made in relation to health macro-regions (figure 3), the profile of the type of PCSC (figure 2) makes it possible to expose data of interest in health planning, as they indicate which types of services and actions should be reinforced, especially in primary care.

However, one should consider the analyses in relation to figure 1 which indicate trends in PCSC and non-PCSC hospitalizations. It is observed that there is a decrease in the trend of HPCSC over time, while the non-PCSC hospitalizations evolves in the opposite direction. Hypotheses such as improvements in

PHC related to longitudinal and multidisciplinary follow-up may explain this phenomenon; however, studies should be conducted to verify which conditions stimulate this effect and the factors involved.

From the characterization of hospitalizations, it was observed that the highest rates of HPCSC affect males, the oldest elderly, and the macro-region of Fortaleza. Considering the fact that HPCSCs may reflect a disorganization of supply, resolution, and access in primary health care, the results of this study are important for a more in-depth analysis of this level of health care in these territories.

The occurrence of HPCSC in the elderly, in addition to other factors, may be related to the most common limitations to access in this population, such as mobility and transportation difficulties and a high degree of dependence. With the increase in life expectancy and population aging, the health problems that most affect this population are chronic diseases and/or long-term diseases, requiring more costly actions and the use of more complex technologies[20].

A study carried out in the state of Ceará pointed to the elderly as being the most vulnerable population, from a physical and financial point of view, and having insufficient understanding of primary care practices. These characteristics may represent the low use of primary care in a preventive way, which may result in increased rates of HPCSC[21].

According to the results of this study, Ceará managed to reduce the number of avoidable hospitalizations in the analyzed time series and presented uniformity in the HMR, except in Central Sertão. Along with this phenomenon, non-avoidable hospitalizations also decreased, and other studies present similar results[22,23,24]. It is worth noting that this evidence of reduction or loss of HPCSC occurs at the same time as there is a transfer of procedures performed in the elderly in an inpatient regime to an outpatient or day-time hospital care.

In addition, it is believed that the state of Ceará is a vanguard in assistance policies in primary care. Professionals are trained by a curriculum that favors training for UHS preparation with a focus on primary care and according to local needs[25,26].

The predominance of HPCSC in elderly males can be explained by several factors, among them, the fact that there is a significantly greater search by women for Primary Health Care, which can be justified by the culturally constructed values of masculinity, by aspects linked to work, and the way in which health services and their teams work[27]. In addition, the higher frequency of hospitalization of elderly males may be related to the practice of negative attitudes by men, such as drinking and smoking habits, lack of physical exercise, and delayed seeking for health services[27]. The results of this study corroborate previous studies, when it was identified that elderly males have higher rates of hospitalization[28,29,30].

In this context, the family health strategy (FHS) teams must act in the care of the male population at all stages of life and not only in older ages. This monitoring must occur through disease prevention and health promotion strategies, encouraging self-care, monitoring risks and vulnerabilities, and, primarily, strengthening the bond with the FHS reference team. Therefore, there is the possibility of improving the rates of use of the health service by men, allowing for more effective care, aiming at improving the health indicators of this specific population[13].

The results of this study showed that the rates of HPCSC were higher among the elderly aged 70-74 years. This finding is similar to the literature, as other authors found a greater distribution of HPCSC in elderly people over 69 years of age[13,31]. This can be explained by the characteristics inherent to physiological aging (senescence) and especially to pathological aging (senility), in which an accumulative, irreversible process of degeneration of an organism occurs, which reduces their ability to cope with stress. This scenario can also be

explained by the increase in life expectancy and progressive aging, which contributes to the increase in chronic conditions[6].

This study showed that among the most prevalent conditions of PCSC, chronic conditions stood out, in line with the literature, which found higher rates of this type of conditions in relation to others[32]. In this context, it is noteworthy that elderly people who have more than one chronic condition are more likely to be hospitalized for primary care sensitive conditions[33]. In a study that evaluated the impact of chronic conditions on HPCSC, it showed that individuals with this type of condition were 1.35 times more likely to undergo HPCSC[34].

In this context, there is a need to improve the monitoring of the elderly population, especially the elderly with comorbidities and more advanced ages[35], and for active and healthy aging to be established, protocols need to be implemented by the FHS teams based on the Care Model for Chronic Conditions[13], as it can collaborate to improve the functional clinical status of the elderly[35] and, thus, avoid new HPCSCs.

When observing the causes of PCSC, it was found that groups related to chronic non-communicable diseases (CNCDs), such as heart failure, in addition to the presence of infectious diseases, were included. This expresses the current and complex Brazilian epidemiological situation, permeated by the persistence of infectious diseases, typical of developing countries, and by the growth of CNCDs related to the population aging process. These findings agree with the results of other studies in which infectious gastroenteritis[6], bacterial pneumonia[36], angina, heart failure, and cerebrovascular diseases[37,38] were the main causes of hospitalization due to PCSC in the elderly.

This scenario requires that Primary Health Care (PHC) teams restructure their work processes to respond to the prevalent and complex CNCDs, which remain throughout the lives of individuals. Therefore, it is necessary that the teams are integrated and incorporate activities, such as the stratification of risk and vulnerabilities of people, as well as the performance of activities of shared care and support in self-care[35,39].

It is reiterated that to ensure comprehensive care for the elderly, within the scope of primary health care, an expanded view of the individual needs to be incorporated through the observation of cognitive aspects, mood, mobility, and communication as essential domains for health, expanding the scope of its work beyond chronic diseases[40].

In this context, it is noteworthy that PHC, in general, proved to be effective, as there was a reduction in HPCSC. It should be noted that the variations presented in the HPCSC panorama may be related to the work process of the health teams and to social determinants, since the living and working conditions directly affect the health-disease process of the population, in addition to possible problems related to the quality of information, which may lead to underestimation of hospitalizations[7]. The deepening of each of these factors becomes a fruitful field for the accomplishment of new studies, conducted according to a quantitative and qualitative approach, with the objective of not just blaming the PHC for the occurrence of these hospitalizations.

Among the limitations of the study, the use of secondary sources is mentioned, under the risk of inconsistencies related to inadequate completion by managers, especially in small municipalities. We also add the analysis of HPCSC rates for the Ceará region, disregarding the local heterogeneity of this indicator at the municipal level.

CONCLUSION

The reduction of HPCSC in the time series covered by the study was observed in most macro-regions of the state, except in the Central Sertão region. In addition, the results found recommend attention to elderly males, especially in the prevention of chronic non-communicable diseases, developing strategies to meet the health needs of this population, as well as greater attention to the control of bacterial pneumonia, heart failure, cerebrovascular diseases, angina, and skin and subcutaneous tissue infections, which accounted for the highest rates of HPCSC.

Author statement CRediT

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All authors read and agreed with the published version of the manuscript.

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