Gastric Cancer in Minas Gerais: Study on the Profile of Hospital Morbimortality

Câncer Gástrico em Minas Gerais: Estudo sobre o Perfil da Morbimortalidade Hospitalar

Cáncer Gástrico en Minas Gerais: Estudio sobre el Perfil de Morbilidad y Mortalidad Hospitalaria

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ABSTRACT

Introduction: Malignant stomach cancer is the fifth most incident type of neoplasm and the third leading cause of death by cancer worldwide. It is a severe pathology, usually diagnosed in advanced stages in Brazil. **Objective:** Analyze, through the records in the Hospital Information System of the Unified Health System (SIH-SUS), the profile of hospitalizations for malignant neoplasm of the stomach in public and private affiliated hospitals in the state of Minas Gerais from 2007 to 2017. **Method:** Descriptive, quantitative, observational, retrospective study with public data from the SIH-SUS, from January 1, 2007 to December 31, 2017. The study sites were the hospital units that are part of the SUS (public or private affiliated). **Results:** There was similarity regarding the national reality for most of the aspects analyzed, such as an increase in the rate of hospitalizations and reduction in hospital mortality rates over the years. Most of the consultations were urgent and in private hospitals. Higher incidence was found for males (67.3%) and individuals aged 60 years or older (60.7%). The mean time of hospitalization was 1.4 times longer in public compared with private hospitals; hospital lethality was higher in the public service (8.9%) compared with private (4.9%) in elective care. **Conclusion:** The distribution of results was heterogeneous among the health macro-regions, demonstrating that the decentralization of resources is still a major challenge for the Brazilian health system. **Key words:** Stomach Neoplasms; Epidemiology, Descriptive; Morbidity; Health Profile; Hospital Information Systems/statistics & numerical data.

RESUMO

Introdução: A neoplasia maligna do estômago é o quinto tipo mais incidente de neoplasia e a terceira principal causa de morte por câncer no mundo. É uma patologia grave, geralmente diagnosticada em estágios avançados no Brasil. **Objetivo:** Analisar, por meio dos registros no Sistema de Informações Hospitalares do Sistema Único de Saúde (SIH-SUS), o perfil das internações por neoplasia maligna do estômago em hospitais conveniados aos setores público e privado no Estado de Minas Gerais de 2007 a 2017. **Método:** Estudo descritivo, quantitativo, observacional, com dados públicos retrospectivos do SIH-SUS, no período de 1 de janeiro de 2007 a 31 de dezembro de 2017. Os locais de estudo foram as unidades hospitalares que integram o SUS (públicas ou particulares conveniadas). **Resultados:** Houve semelhança quanto à realidade nacional na maioria dos aspectos analisados, como aumento na taxa de internações e redução das taxas de letalidade hospitalares no decorrer dos anos. A maioria dos atendimentos foi de urgência e em regime privado. O sexo masculino (67,3%) e a faixa etária de pessoas com 60 anos ou mais (60,7%) obtiveram maior incidência. O tempo médio de internação foi 1,4 vezes maior no regime público do que no privado; a letalidade hospitalar foi maior no serviço público (8,9%) em relação ao privado (4,9%) nos atendimentos eletivos. **Conclusão:** A distribuição dos resultados foi heterogênea entre as Macrorregiões de Saúde, demonstrando que a descentralização de recursos ainda é um grande desafio do sistema de saúde brasileiro. **Palavras-chave:** Neoplasias Gástricas; Epidemiologia Descritiva; Morbidade; Perfil de Saúde; Sistemas de Informação Hospitalar/estatística & dados numéricos.

RESUMEN

Introducción: La neoplasia maligna del estómago es el quinto tipo de cáncer más común y la tercera causa principal de muerte por cáncer en todo el mundo. Es una patología grave, generalmente diagnosticada en etapas avanzadas en Brasil. **Objetivo:** Analizar, a través de los registros en el Sistema de Información Hospitalaria del Sistema Único de Salud (SIH-SUS), el perfil de hospitalizaciones por neoplasia maligna del estómago en hospitales afiliados al sector público y privado en el estado de Minas Gerais de 2007 a 2017. **Método:** Estudio descriptivo, cuantitativo, observacional, con datos públicos retrospectivos del SIH-SUS, del 1 de enero de 2007 al 31 de diciembre de 2017. Los sitios de estudio fueron las unidades hospitalarias que forman parte del SUS (acuerdos públicos o privados). **Resultados:** Hubo similitud con respecto a la realidad nacional en la mayoría de los aspectos analizados, como un aumento en la tasa de hospitalizaciones y una reducción en las tasas de mortalidad hospitalaria a lo largo de los años. La mayoría de las consultas fueron urgentes y privadas. El sexo masculino (67,3%) y el rango etario de las personas de 60 años o más (60,7%) tuvieron una mayor incidencia. La estadía promedio en el hospital fue 1,4 veces más larga en el régimen público que en el privado; mayor letalidad hospitalaria en el servicio público (8,9%) en comparación con el privado (4,9%) en atención electiva. **Conclusión:** La distribución de los resultados fue heterogénea entre las regiones de macro-salud, lo que demuestra que la descentralización de los recursos sigue siendo un desafío importante para el sistema de salud brasileño. **Palabras clave:** Neoplasias Gástricas; Epidemiología Descriptiva; Morbilidad; Perfil de Salud; Sistemas de Información en Hospital/estadística & datos numéricos.

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INTRODUCTION

Among the types of cancer, malignant neoplasm of stomach (MNS) is the fifth more incident and the third cause of death worldwide[1,2]. According to the National Cancer Institute José Alencar Gomes da Silva (INCA)[3], in 2017, 14,313 deaths by stomach cancer occurred in Brazil, 64.3% of these in men. For each year of the triennium 2020-2022 it is estimated the occurrence of 13,360 new cases of stomach cancer in men and 7,870 in women in Brazil. In the Southeast region, stomach cancer is the fourth more frequent in men (13.99 cases/100 thousand inhabitants) and the seventh in women (7.30 cases/100 thousand inhabitants)[3].

MNS is a severe multifactorial etiology pathology typically diagnosed in advanced stages in Brazil[4]. The risk factors described in the literature are men older than 35 years of age, with poor intake of fruits and vegetables, with predominance of salty, smoked, or preserved food, history of gastric cancer, tobacco use and lower social class. The clinical factors include gastric infection by *Helicobacter pylori (H. Pylori)*, chronic atrophic gastritis, intestinal metaplasia, pernicious anemia, gastric adenomatous polyps, disease of Menetrier and familial adenomatous polyposis[3-6].

Studies have demonstrated direct association between levels of infection by *H. Pylori* and incidence of gastric cancer, suggesting that the success of controlling this infection together with improvement of basic sanitation is the motive for the drastic reduction of the cases of this neoplasm. Possible preventive actions consist in modifying the lifestyle of the population, changing the food intake, and reducing smoking and obesity[7-9].

The prognosis is more favorable when the diagnosis is early. In Brazil, it occurs only from 2.0% to 16% of the cases. In Japan, for comparison, approximately 50% of the cases diagnosed occur early[10].

Within this scenario, the disease is a public health problem, mainly in developing countries and low socioeconomic groups. The action of health managers in monitoring the morbidity caused by gastric cancer is relevant through the creation of programs, analysis of the population profile and surveillance systems. These initiatives should be translated into epidemiologic analyzes capable to guide the conducts to promote prevention, early diagnosis, control of the disease and its risk factors[3].

One of the main challenges of the National Health System (SUS) for gastric cancer is to circumvent the fragmentation of the care provided to the patients and for this, early detection, and timely treatment, in addition to non-fragmented system, skilled professionals and proper infrastructure are required[6].

The information systems of SUS are essential to control and evaluate the medical care provided. One of the main systems is the System of Hospital Information SUS (SIH-SUS), created in 1981 with the objective to register all the consultations of hospital admissions funded by SUS and based in these records, issue reports to the managers to fund health units[11].

The objective of this study is to analyze the profile of admissions by MNS in public and private associated hospitals through SIH-SUS records in the State of Minas Gerais from 2007 to 2017.

METHOD

Descriptive, quantitative, observational study with retrospective public data of SIH-SUS available at the website of the Information Department of the National Health System (DATASUS). Admissions by MNS whose International Statistical Classification of Diseases and Related Health Problems – ICD, 10th edition (ICD-10) is C16. The period of the investigation was from January 1, 2007 to December 31, 2017.

The study sites were the hospitals of the state of Minas Gerais associated with SUS (public or private). Minas Gerais is a Southeast Brazilian state, with a population of 21,119,536 inhabitants in 2017 in an area of 586,520.732 km²[12].

The variables selected were year of admission (2007-2017), Macroregion of Health (MH), nature (urgency and emergency) and regimen of consultation (public and private), deaths (quantity of admissions who were discharged by death), age-range (<20 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years, ≥60 years and age ignored), race/color (White, Black, Brown, Yellow, Indigenous or without information) sex (male, female and ignored) mean stay of the patient admitted (days) and mean value of admission (Real – R$).

Microsoft Excel® and Epi Info 7.2™ were utilized for the calculation of the rates and absolute and relative frequencies. The rates of hospital lethality (rate between the number of deaths and number of admissions multiplied by 100) and of admission (rate between the number of admissions and the resident population of Minas Gerais multiplied by 100 thousand). Due to missing population per MS for 2017, the rate of admission was analyzed for the period 2007-2016. The population data are referred to the Census of 2010 of the "*Instituto Brasileiro de Geografia e Estatística (IBGE)*", utilizing the method of calculation of arithmetic interpolation to estimate the resident population in the years 2007-2009 and 2011-2017.

The review by the Institutional Review Board (IRB) was waived because only public domain unidentified

secondary data were used. However, the investigators complied strictly with the International Norms of Research with Human Beings and Ordinance 466/2012 of the Ministry of Health[13].

RESULTS

Between 2007 and 2017, 30,833 hospitalizations by MNS in Minas Gerais (mean of 2,803 admissions/year) and 4,995 hospital deaths (mean of 454 deaths/year) were reported, the rate of admission of the period was 13.8 hospitalizations/100 thousand inhabitants and hospital lethality of 16.2%. In the study period, there was increase of the admissions and of the rate of admission, standing out the year 2016 with the highest figures of the historical series (18.0 admissions/100 thousand inhabitants, 15.6%). For deaths and hospital lethality, along the years investigated, the figures were lower (Figure 1).

The State of Minas Gerais has 13 MS. Figure 2 shows the annual mean distribution of admissions and deaths, in addition to hospitalization and lethality rates per MNS in each MS.

The highest means of hospitalizations were found in the MS *Sul*, *Centro* and *Sudeste* (376.6; 852.4; 372.5, respectively) and deaths (48.3; 153.3; 58.5, respectively). However, the highest means of admissions per 100 thousand inhabitants were found in the MS of *Centro-Sul* (17,.4), *Sudeste* (23.1) and *Leste do Sul* (22.4) and the highest hospital lethalities were in *Oeste* (26.4%), *Norte* (19.7%) and *Triângulo do Norte* (26.4%). The

MS *Triângulo do Norte* (10.5 days) and *Centro* (9.1 days) presented the highest means of stay while *Leste* (5.5 days) and *Sul* (5.7 days), the lowest. For all MS, this variable tended to decrease, reaching 35% between 2008 and 2017. The greatest drop was in MS *Sul*, from 8.4 to 4.1 days (51%) and the lowest, in *Sudeste*, from 8.6 to 8.2 days (8%).

In the State, 79.9% (24,649) of the hospitalizations were urgent and 20.1% (6,184), elective. The urgent consultations of MNS in the MR *Centro-Sul* (91.5%) and *Centro* (89.9%) stand out and highest rates urgency/elective (10.8 and 8.9, respectively). The predominance is private consultations (18,823 admissions, 61.0%). The high percentage of records without information is noteworthy (8,398 admissions, 27.2%) (Table 1).

Of the total individuals admitted, 67.3% were men with 67.2% of the deaths. No difference of hospital lethality among sexes was found (Table 2). There was prevalence of individuals with 60 years or more (60.7%), but the distribution of the admissions by sex varied among ages. For race/color, most of the cases occurred with Brown (47.3%) and White (29.2%) races, the rate among men and women was greater than 2.0 for all races (Table 2).

The state of Minas Gerais presented means of stay in the hospital of 7.7 days during the period investigated, with drop of 9.7 in 2008 to 6.3 in 2017. The values were similar to elective consultation (7.6 days) and urgency (7.7 days). However, in public regimen (10.2 days), the admission was 1.4 greater than private regimen (7.7 days).
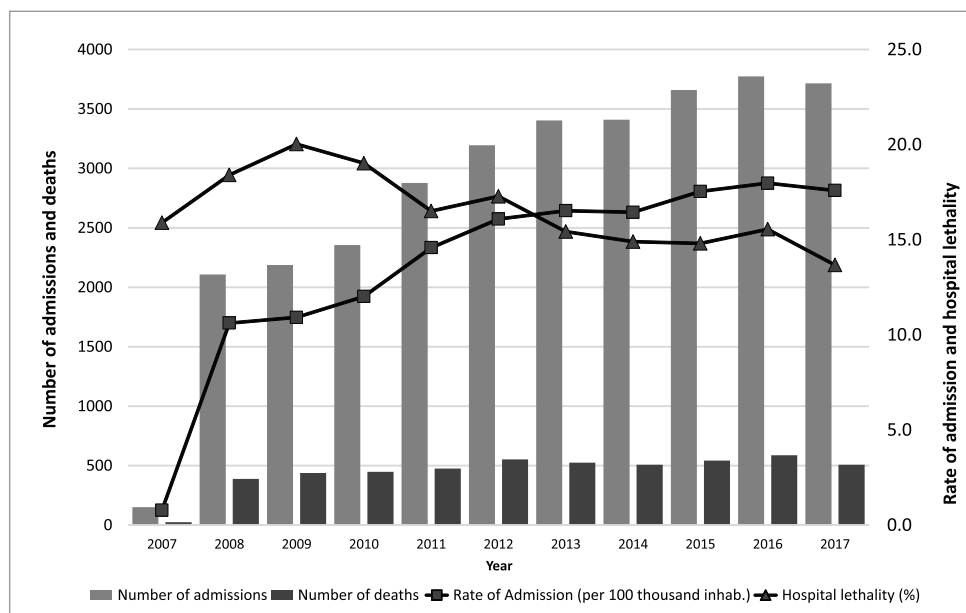
Figure 1. Number of admissions and deaths and rate of admission (per 100 thousand inhabitants) and hospital lethality (%) per malignant neoplasm of stomach. Minas Gerais, Brazil, 2007 - 2017

Source: Ministry of Health . System of Hospital Information of SUS (SIH-SUS).
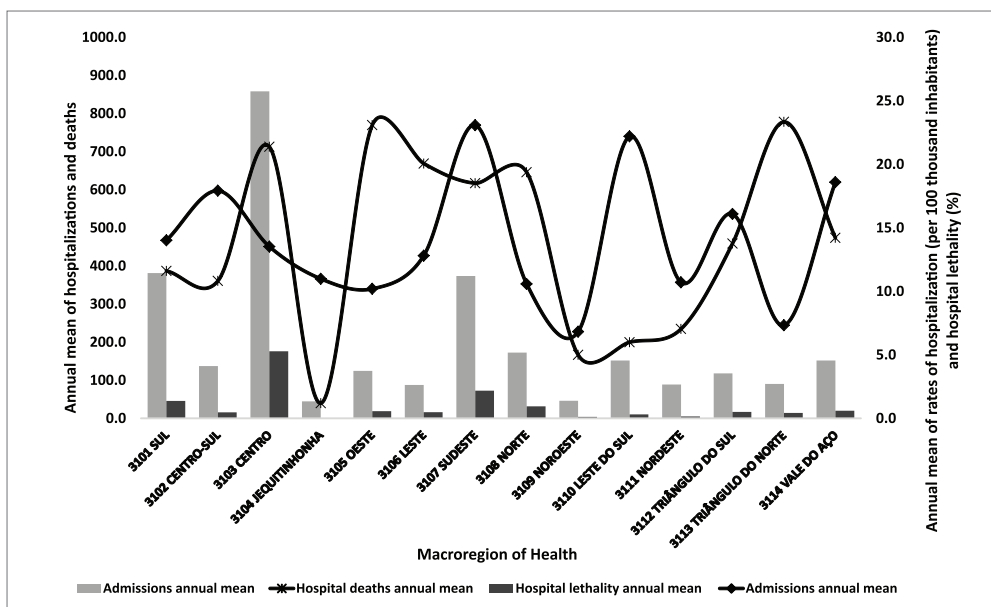
Figure 2. Mean (annual) of admissions and deaths and mean rates (annual) of admissions (per 100 thousand inhabitants) and hospital lethality (%) per malignant neoplasm of the stomach per Macroregion of Health. Minas Gerais, Brazil, 2007-2017

Source: Ministry of Health . System of Hospital Information of SUS (SIH-SUS).

Table 1. Nature and regimen of visits, rate of urgent and elective visits and rate of public and private consultations of malignant neoplasms of the stomach per federation unit and macroregion of health. Minas Gerais, 2007-2017

Federation Unit	Nature of the consultation				Rate	Regimen						Rate
	Elective		Urgency		Urgency/	Public		Private		Ignored		Private/
Macroregion of Health	n	%	n	%	Elective	n	%	n	%	n	%	Public
Sul	1.225	29.6	2.918	70.4	2.4	797	19.2	2,121	51.2	1.225	29.6	2.7
Centro-Sul	127	8.5	1.370	91.5	10.8	47	3.1	1,069	71.4	381	25.5	22.7
Centro	943	10.1	8.433	89.9	8.9	1.495	15.9	5,087	54.3	2.794	29.8	3.4
Jequitinhonha	37	11	300	89	8.1	20	5.9	209	62	108	32	10.5
Oeste	517	37.7	856	62.3	1.7	48	3.5	948	69	377	27.5	19.8
Leste	336	12.8	2.294	87.2	6.8	84	3.2	1,723	65.5	823	31.3	20.5
Sudeste	983	24	3.115	76	3.2	78	1.9	3,168	77.3	852	20.8	40.6
Norte	499	26.7	1.371	73.3	2.7	145	7.8	1,235	66	490	26.2	8.5
Noroeste	177	34.8	332	65.2	1.9	143	28.1	246	48.3	120	23.6	1.7
Leste do Sul	489	29.5	1.170	70.5	2.4	8	0.5	1,273	76.7	378	22.8	159
Nordeste	111	10.4	953	89.6	8.6	88	8.3	659	61.9	317	29.8	7.5
Triângulo do Sul	384	29.8	905	70.2	2.4	146	11.3	851	66	292	22.7	5.8
Triângulo do Norte	356	36	632	64	1.8	513	51.9	234	23.7	241	24.4	0.5
Minas Gerais	6,184	20.1	24.649	79.9	4	3,612	11.7	18,823	61	8.398	27.2	5.2

In the elective nature, the mean value of admission was higher (R$ 4.429,28) in comparison with urgency (R$ 1.807,94) (Table 3).

For hospital mortality the elective nature presented an expressive lethality in the public regimen (8.9%) if compared with the private (4.9%). However, the highest lethalities were recorded in urgent consultations (18.9%) with values close to the public (21.5%) and private (19.6%) regimens (Table 3).

DISCUSSION

Through the analysis of SIH-SUS, the status of hospital admission by MNS in Minas Gerais is similar

Table 2. Number of admissions and deaths, hospital lethality (%), rate of admission (per 100 thousand inhabitants), age-range and color/race per sex. Minas Gerais, 2007-2017

Characteristics	Sex					Total	
	Men		Women		Rate M/F		
	n	%	n	%		n	%
Admissions	20,756	67.3	10,077	32.7	2.1	30,833	100
Deaths	3,356	67.2	1,639	32.8	2	4,995	100
Hospital Lethality (%)	16.2	16.3	1	16.2	1	16,2	
Rate of admission (per 100 mil inhab.)	18.6	8.9	2.1	13.7	2,1	13,7	
Age range							
Under 20 years	60	55.6	48	44.4	1.3	108	0.4
20 to 29 years	137	46.6	157	53.4	0.9	294	1
30 to 39 years	591	51.2	563	48.8	1	1,154	3.7
40 to 49 years	2,072	62.2	1,258	37.8	1.6	3,330	10.8
50 to 59 years	5,035	69.8	2,183	30.2	2.3	7,218	23.4
60 years or more	12,861	68.7	5,868	31.3	2.2	18,729	60.7
Color/race							
White	6,096	67.6	2,921	32.4	2.1	9,017	29.2
Black	1,767	69.6	773	30.4	2.3	2,540	8.2
Brown	9,755	66.9	4,832	33.1	2	14,587	47.3
Yellow	149	75.6	48	24.4	3.1	197	0.6
Indigenous	20	71.4	8	28.6	2.5	28	0.1
No information	2,969	66.5	1,495	33.5	2	4,464	14.5

Table 3. Mean of stay (days), mean value of admission (reais – R$) and hospital lethality (%) according to regimen (public or private) and nature (elective or urgency) of the visit. Minas Gerais, 2007-2017

Regimen/ Nature of the consultation	Elective			Urgency			Minas Gerais		
	Mean stay (days)	Mean value of admission (reais)	Hospital Lethalit (%)	Mean stay (days)	Mean value of admission (reais)	Hospital Lethality (%)	Mean stay (days)	Mean value of admission (reais)	Hospital Lethality (%)
Public	9.7	R$ 5,214.38	8.9	103	R$ 2,324.89	21.5	**10.2**	**R$ 2,988.07**	**18.6**
Private	7.6	R$ 4,109.08	4.9	7.7	R$ 1,669.53	19.6	**7.7**	**R$ 2,192.87**	**16.4**
Ignored	6.2	R$ 4,916.86	4.4	6.8	R$ 18,93.76	16.6	**6.7**	**R$ 2,367.85**	**14.7**
Minas Gerais	**7.6**	**R$ 4,429.28**	**5.4**	**7.7**	**R$ 1,807.94**	**18.9**	**7.7**	**R$ 2,333.69**	**16.2**

to the national reality. 10.6 admissions/100 thousand inhabitants were recorded for the whole country while in the State, the rate was 13.8%. The rate of hospital lethality in the State of Minas Gerais was 16.2% in comparison with 17.6% of the country[11]. The growth of the number and rate of admissions in the period investigated indicates a possible increase of the diagnosis of stomach cancer and the need to meet the demands of therapeutic procedures and complications associated with the disease and its morbidity. A study showed the increase of funds for medium and high complexity outpatient and hospital procedures in Minas Gerais[14].

Neoadjuvant chemoradiotherapy, molecular therapy and immunotherapy have contributed for the improvement of the treatment of advanced gastric cancer, which is associated with increase of survival and possibly, reduction of deaths and rate of hospital lethality along the years investigated in the study[15].

MH have heterogeneous rates of hospital morbimortality in Minas Gerais. The organization of the

services follows the technological densities, nevertheless, health services are impacted by regional inequalities with more services, equipment and human resources concentrated in the Central and South regions of the State[16]. Higher admission rates in the regions *Centro-Sul* (17.4), *Sudeste* (23.1) and *Leste do Sul* (22.4) corroborate this scenario. The regions with highest hospital lethality [*Oeste* (26.4%), *Norte* (19.7%) and *Triângulo do Norte* (26.4%)] have also lower rates of admission than the State average (13.8/100 thousand inhabitants). The rate of hospital lethality is possibly impacted by elevated rates of admission, both for curative procedures and management of complications.

A study conducted in Rio Grande do Sul showed predominance of urgent (58.10%) over elective consultations (41.89%) of hospital admissions per neoplasms[17]. The same tendency was found in this study, the difference between the two profiles of MNS was even bigger (79.9% urgent *versus* 20.1% elective). A possible explanation is that MNS are mostly diagnosed in advanced stages in Brazil, unlike other neoplasms, submitting the patient to more complications and urgent consultations[4,18].

The admissions by MNS in Minas Gerais follow the standard of admissions in Brazil, mainly of private regimen because there are more beds available[19].

Highest percentage occurred in males (67.3% of the cases), similar to a study conducted in São Luís (MA), where males represented 59.5% of the cases[20]. Another study also demonstrates higher incidence among men with 67% of the cases[4]. In addition, the present study concurs with the national tendency with incidence of 64.9% in males and regional tendency of 65.24%[11]. These results are in line with the study demonstrating that the percentages are two to three-fold higher in men than in women[21]. The causes for this difference are unclear, possibly environmental, and occupational exposure may cause impact. The highest prevalence of smoking in men than in women potentially influences the onset of this pathology[22]. Additional explanations would be the physiological differences. Estrogen would be a protector factor for the development of MNS which justifies low incidence in women, mainly in gestational age and increase of incidence after 40 years of age[23], similar to the present study. From 0 to 39 years old, there were 768 cases of MNS in women and from 40 to 49, 1,258 cases.

The age-range with highest incidence of MNS was 60 years or more (60.7%), different from another study where the age-range 41-60 years old (46.9%) presented the highest percentage[20]. A study conducted in Paraná corroborates the results of this study, where 68.7% of the patients were older than 60 years[24]. In addition, it concurs

with the national standard of 57.9% and is similar to the regional standard of 60.7%[11]. A study conducted in Cuba indicates that 66.6% of the cases of MNS occurred in older than 60 years of age showing strong correlation of the incidence with this age-range[25]. 5.1% of the patients with gastric cancer are younger than 40 years of age, also concluded by other study where a variation of 2.9% was found[26].

The highest incidence were found in Brown and White races with 46.3% and 29.2%, respectively, similar to another study with 66.7% of Brown patients and 21.7% of White patients[20]. However, results obtained for the population of the States of São Paulo and Rio de Janeiro concluded that White race was predominant in comparison with Minas Gerais. In this case, the State does not follow the regional tendency with only 29.4% of Brown patients and 47.3% of White patients and the national tendency with 31% Brown patients and 42.7% of White patients[11].

The State presented a mean of stay of 7.7 days in admissions with drop of 35% in the period investigated, lower than the Brazilian mean for MNS, 8.2 days, but with similar drop (32%) and higher than the State mean for neoplasms in general, 5.6 days[11].

The means were similar in elective and urgency consultations, unlike what was found in a study investigating patients with MNS from 1998 to 2013[27]. Elective consultation presented a statistically significant difference of 1.54 days of stay compared with non-elective. The author attributed this result to the increase of the use of palliative and home care. In the same study, there was a drop of the stay in the period of 12 days in 1999 to 6.7 in 2012, similar to what was seen in the State, from 14 days in 2007 to 6.3 in 2017.

In Minas Gerais the mean time of admission was 1.4-fold higher in public compared with private hospitals. They may be related to cases of advanced stages needing intensive therapy and with more complications[27,28].

Hospital lethality is bigger in public (89%) compared with private hospitals (4.9%) in elective consultations, a difference not found in emergency.

Reports of extended length of stay, mortality, and other indicators of worse performance in the public service are not rare in the literature and indicate there are deficiencies in healthcare, socioeconomic, and vulnerabilities of patients consulted in public hospitals[29-34]. Therefore, higher mean value of admission in public than in private hospitals is found, R$ 2.988,00 and R$ 2.192,37, respectively. The mean value of admission in public in comparison with private hospitals is explained by extended length of stay and more severe and complex cases in public hospitals[35,36].

The value of hospital lethality for Minas Gerais was lower than the country's, but higher than mortality by neoplasms in general in the State, 8.44%[11]. No relevant differences between sexes was found in concurrence with other studies about the theme[27,37]. High lethality in emergency concurs with the literature. Emergency consultations are associated with more advanced stages of the disease, complications, comorbidities, and worse socioeconomic conditions[38-41].

It was found a mean cost 1.4-fold higher for elective than emergency admissions. This data corroborates the study that found a statistically significant difference among the nature of the admissions (U$ 2.0156,20)[27]. The motive for this difference is still unclear. Typically, the treatment determined for MNS is different in the two types. The emergency approach occurs overall due to bleeding, obstruction, or gastric perforation. Usually, the initial goal is the clinical stabilization of the patient and immediate solution of the problem, and the definitive and more complex approach is left for a second moment[38,39]. In the elective approach, surgery can involve greater, more complex and aggressive procedures with multi-visceral resections and reconstruction of the gastric transit[42,43]. Other factors and treatments impacting the costs which are different in the two types of admission, such as differences between the occurrence of adverse effects and drugs, can also justify this discrepancy, but more studies are necessary to address these relations[44,45].

The mean cost of admission in Minas Gerais for MNS was similar to the national (R$ 2.340,00) but higher than the cost for neoplasms in general in the State. Studies of Panama and Chile found values of US$4.259,00 and US$7.642,00, respectively[37]. A study encountered raising numbers in USA of US$ 25.898,00 in 1998 until US$70.635,00 in 2013[27]. Hospital admissions, intensive care unit, complications and comorbidities are important factors in cancer treatment costs[27,37]. The fluctuation of the US exchange rate along the years and the lack of specification of the conversion restrain the comparisons between the studies.

The discrepancy among the population data per MNS in 2007 in relation to the other years is the main limitation of the present study, reason for which these data were excluded from the analysis. In addition, missing population data in 2017 per MNS impeded the analysis of the rate of admission for this year.

CONCLUSION

The hospital morbimortality of gastric cancer in Minas Gerais is similar to the national reality in many aspects as concluded in this study. Despite the improvement of general life and health conditions of the population – better sanitation and technological medical progress – the results show that the distribution of the funds is heterogeneous in the MS and decentralization is still one of the great challenges of the Brazilian health system.

Due to the paucity of epidemiological studies about gastric neoplasm in Minas Gerais and in Brazil, the comparison of the results was difficult, which ratifies the necessity of new studies since the monitoring of morbimortality is required for the improvement of public health.

CONTRIBUTIONS

All the authors contributed equally for the study design or conception, collection, analysis and/or interpretation of the data, wording and/or critical review with intellectual contribution and approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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