ORIGINAL ARTICLE
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Brazilian Public Health System: history and profile of heart failure care and the impacts of COVID-19

Sistema Público de Saúde Brasileiro: história e perfil dos cuidados com a insuficiência cardíaca e os impactos da COVID-19

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DOI: 10.21115/JBES.v14.n2.p140-148

Keywords:
public health system; heart failure; cardiology; COVID-19

ABSTRACT

Objective: The objective of this study is to describe the general and specific context of hospitalizations for Heart Failure (HF) in the Unified Health System and its main care indicators and economic aspects in the period before and during COVID-19. **Methods:** The economic indicators were evaluated between January 2011 and June 2022, comparing these indicators before and during the COVID-19 pandemic, using data from the DataSUS Health Information of the Ministry of Health of Brazil. The number of hospitalizations, length of stay, lethality and hospitalization costs were evaluated. The ARIMA method and the general regression model were used to analyze monthly results before and during COVID-19. **Results:** Hospitalization for HF has decreased in the last 11 years, with the most significant drop in the COVID-19 pandemic. After the pandemic, there was an increase in lethality in patients hospitalized for HF and also an increase in length of stay, despite the decrease in hospitalizations. When analyzing the economic aspects, more than US$ 725 million were spent. The average ticket showed a clear drop in per capita investment, with a real devaluation of 30.46% in the period from 2011 to 2022, which can be related to two main hypotheses: increased effectiveness and effectiveness of the analysis of service costs and/ or chronic underfunding of the Brazilian Public Health System. **Conclusion:** HF has its lethality worsened over time, especially in the COVID-19 period, also associated with a significant expense with the SUS and a tendency to decrease the allocation of resources.

Palavras-chave:
sistema público de saúde; insuficiência cardíaca; cardiologia; COVID-19

RESUMO

Objetivo: O objetivo deste estudo é descrever o contexto geral e específico das internações por insuficiência cardíaca (IC) junto ao Sistema Único de Saúde e seus principais indicadores assistenciais e aspectos econômicos no período pré e durante a COVID-19. **Métodos**: Os indicadores econômicos foram avaliados no período entre janeiro de 2011 e junho de 2022, comparando esses indicadores antes e durante a pandemia por COVID-19, utilizando dados do DataSUS Informações de Saúde do Ministério da Saúde do Brasil. Foram avaliados o número de internações, tempo de internção,

Received on: 03/09/2022. **Approved for publication on:** 01/11/2022.
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Availability of data and materials: The data sets generated and/or course during the current study are available in the files sent to the journal.
Competing interests: None of the authors has conflicting interests with the research.
Authors contributions: June Alisson Westarb Cruz and Lidia Ana Zytynski Moura: He structured the text of the article and organized the relationship between the data and the theoretical approach, analyzed the practical impacts and suggestions of the research and submitted the article to the jornal; Gustavo Martini Buso and Tiago Zequinão: Organized the database, tables, graphs and the structure of the article; Maria Alexandra Viegas Cortez da Cunha and Juliano Gasparetto: Revised the theoretical approach of the article; Thyago Proença de Moraes and Felipe Francisco Tuon: It reviewed the coherence of the research, formatting and revision of the English language and the theoretical approaches to statistics analysis.
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letalidade e custos de internação. O método ARIMA e o modelo de regressão geral foram usados para analisar os resultados mensais antes e durante a COVID-19. **Resultados**: A hospitalização por IC diminuiu nos últimos 11 anos, com queda mais significativa na pandemia da COVID-19. Após a pandemia, houve aumento da letalidade em pacientes internados por IC e também um aumento do tempo de permanência, mesmo diante da diminuição das internações. Ao analisar os aspectos econômicos, foram gastos mais de US$ 725 milhões. O *ticket* médio apresentou uma clara queda no investimento *per capita*, com desvalorização real de 30,46% no período de 2011 a 2022, o que pode estar relacionado a duas hipóteses principais: aumento da efetividade e efetividade da análise de custos do atendimento e/ou subfinanciamento crônico do Sistema Público de Saúde Brasileiro. **Conclusão**: A IC tem sua letalidade agravada ao longo do tempo, principalmente no período da COVID-19, associada também a um gasto relevante com o sistema público brasileiro e a uma tendência de diminuição da alocação de recursos.

INTRODUCTION

Heart failure (HF) affects approximately 23 million people on the planet, with worldwide prevalence and incidence reaching epidemic scales, in addition to presenting high morbidity and mortality. It is estimated that in the period from 2012 to 2030, the prevalence of HF will increase by 46%, resulting in 8 million people worldwide over 18 years of age with this pathology (Severino *et al*., 2020). In Brazil, the prevalence exceeds 2 million patients, its incidence is approximately 240,000 cases per year (Cestari VRF, *et al*., 2022).

Due to the complexity of the pathophysiology of the disease in question, added to the aging of the population and its comorbidities, hospitalization rates of outpatients due to complications resulting from HF remain high (Bromage *et al*., 2020).

Given the initial presentation of the public health sector and the notorious importance of the cardiology specialty and the prevalence of Heart Failure (HF) in the Brazilian context, the objective of this study is to report the impact of the COVID-19 pandemic on hospitalizations for HF, and results clinicians.

METHODS

This study is a descriptive and exploratory study, using secondary data from various sources, such as: IBGE (IBGE, 2022; IBGE, 2009), IPEADATA (IPEADATA, 2022) and Tabnet (DATASUS, 2022). The data were submitted to quantitative data analysis methods.

The database was structured in a panel model, covering information from month to month, from each state in Brazil and also at the national level. The bases were separated as follows: physical structure (general and specialized hospitals, basic health units and emergency care units), beds (general clinical and surgical, and specialized in clinical and surgical cardiology), human resources (number of doctors with active records and primary enrollments, being filtered by cardiologist and cardiovascular surgeon specialties), and finally a heart failure morbidity database, including information on hospitalizations, average length of stay, deaths, fatality rate, average ticket and total payment.

To search for the data, chapter IX of the ICD 10 was selected, with the title of diseases of the circulatory system. The heart failure code on ICD 10 is I50 (ICD 10 Data, 2022).

The analysis of the average ticket was performed considering its nominal value and corrected by the General Index of Brazilian Consumer Prices in Health (IPCA – Health) (IPEADATA, 2022), thus enabling, comparing not only the historical series in its value, but also its ability to convert into value over time.

For the comparative analysis between the pre- and during COVID-19 periods and for the analysis of interrupted time series, the data were summarized, disregarding the Federative Unit, and demonstrated as monthly measures. Monthly hospitalizations were relativized by 100,000 inhabitants of Brazil; the permanence data represent a monthly average on days when the patient remained hospitalized; the lethality rate represents the average number of deaths by active patients; and finally, the average monthly ticket, which portrays the financial value, in dollars, received by hospitals for each hospitalization related to heart failure.

An analysis of interrupted time series (STI) was developed, with the purpose of estimating the effects on levels and trends, referring to the monthly data of hospitalizations per 100,000 inhabitants, hospital stay, lethality and average ticket paid by the SUS. We defined the breaking point in March-April 2020, a period where the first lockdowns and changes in the hospital care structure began, due to the emergence of COVID (The Lancet, 2021). For this, we used the ARIMA method, and the general regression model to analyze the outcomes monthly can be described as:

$$Yt = \beta 0 + \beta 1T + \beta 2Xt + \beta 3TXt$$

Where β0 is interpreted as the initial level in T = 0, β1 is the change in the outcome associated with the increase of the time units, β2 indicates the change of level after the intervention and β3 corresponds to the change in the trend after the intervention. A descriptive analysis of the variables was also performed, and t-Student or Mann-Whitney tests were performed to compare the pre- and post-covid periods according to the distribution of the variables. All tests were performed in the SPSS 25.0 program and the $p < 0.05$ values considered as statistical significance.

RESULTS

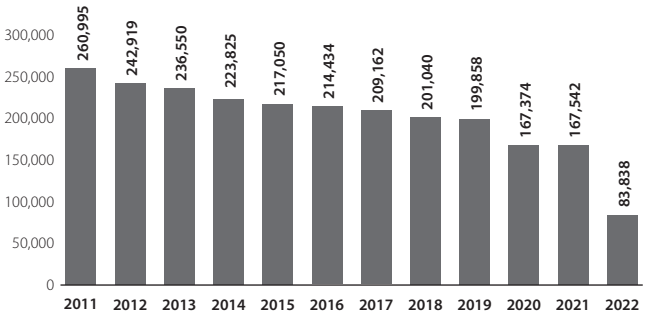
Descriptive analysis: hospitalization, permanence, lethality, and expenses.

Brazil is a country of great territorial extension, has 8.5 million km (IBGE, 2022) square and a population of approximately 215 million people (IPEADATA, 2022). Its health system comprises the state's performance, through the Unified Health System (SUS) and the private sector, active in the supplementary health system (Paim *et al*., 2011). The country presents great challenges in the health area (Rocha *et al*., 2021), part of them, due to the intense socioeconomic inequality present in the country (Castro *et al*., 2019) (Gini Index 48.9) (Cruz *et al*., 2022). Currently, the Unified Health System has 5,395 general hospitals 1,004 specialized hospitals (DATASUS, 2022), 8,525 basic health units, covering 125,880 clinical beds and 73,446 surgical beds and 545,833 active medical professionals, with primary enrollment, registered with the Federal Council of Medicine (CFM, 2022).

Cardiology is one of the medical specialties with the highest prevalence of care with the SUS. In 2022, the specialty has 4,405 clinical beds and 2,856 surgical beds, 16,156 cardiologists and 1,158 cardiovascular surgeons (CFM, 2022). During this period, the SUS performed more than 130,253,441 hospitalizations (from January 2011 to June 2022), of which 2,424,587 were due to heart failure (DATASUS, 2022).

In Brazil, the specialty of cardiology represents 3.17% of the total number of physicians available in the country (DATASUS, 2022), of which 0.21% were surgeons and 2.96% cardiologists (DATASUS, 2022). Of the total beds available in the SUS, 3.64% are exclusive to the specialty, being 2.21% clinical and 1.43% surgical (DATASUS, 2022).

HF showed a reduction in the number of hospitalizations in the last decade, more significantly after the advent of the pandemic. As seen in Graph 1, in 2011, 260,995 hospitalizations were recorded across the country, reducing to 199,858 in 2019. More specifically, in 2020, reaching 167,374 cases with a trend curve, still low, in 2022, which until June, presents a total of 83,838 cases with a monthly average of 8,547 cases, 37.75% lower than the monthly average of 2011 and 16.10% lower than the monthly average of 2019.



Graph 1. Historical series of hospitalizations of HF form January 2011 to June 2022

Observing the nominal values in relation to the population, there was a decrease from 132.81 cases per 100,000 inhabitants in 2011 to 78.58 cases for every 100,000 inhabitants in 2021, making a significant decrease of 40.83% in Table 1.

Observing this historical series by states of the Brazilian federation, the general behavior of Brazil is repeated in most states, according to data presented in Table 2.

Although the history of hospitalizations from HF with the SUS, presents a significant decrease, in relation to the Length of Stay rate of hospitalized patients, the period increases. As shown in Graph 2, in 2011, the length of stay of the hospitalized HF patient was 6.75 days on average, reaching the period of 8.03 days in 2019, with a decrease from 2020, which has an average of 7.82 days, 8.33 in 2021, and 7.87 in 2022, data until June.

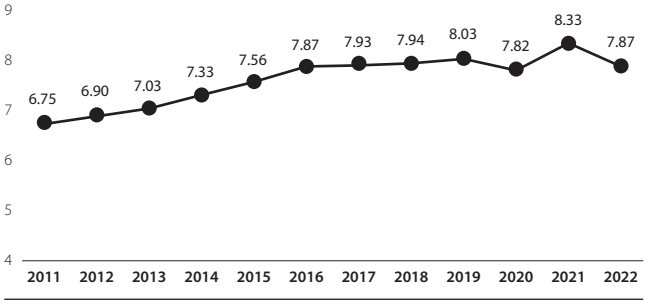
Observing this historical series of permanence by states of the Brazilian federation, The states of Pará, Roraima, Ceará, Paraíba, Mato Grosso do Sul, São Paulo, Maranhão, São Paulo,

Table 1. Historical series of hospitalizations of HF 2011 to 2022 for every 100,000 inhabitants

Year	Population	Hospitalization	%	Hospitalization per 100,000 inhabitants
2011	196,518,336	260,995	0.13%	132.81
2012	198,238,982	242,919	0.12%	122.54
2013	199,961,359	236,550	0.12%	118.30
2014	201,680,589	223,825	0.11%	110.98
2015	203,391,796	217,050	0.11%	106.72
2016	205,090,103	214,434	0.10%	104.56
2017	206,770,634	209,162	0.10%	101.16
2018	208,428,511	201,040	0.10%	96.46
2019	210,058,858	199,858	0.10%	95.14
2020	211,656,799	167,374	0.08%	79.08
2021	213,217,457	167,542	0.08%	78.58
2022	214,361,981	83,838	0.04%	39.11

Table 2. Average number of hospitalization per 100,000 inhabitants in 2011, 2013, 2015, 2017, 2019 and 2021

Region	State	2011	2013	2015	2017	2019	2021
North	Rondonia	107	108	100	100	83	76
North	Acre	65	53	46	50	35	36
North	Amazonas	67	57	57	52	65	56
North	Roraima	73	73	65	77	65	48
North	Pará	80	70	60	57	55	45
North	Amapá	56	53	47	34	31	27
North	Tocantins	143	132	79	74	70	56
North East	Maranhão	87	82	57	56	49	43
North East	Piauí	163	161	140	140	134	119
North East	Ceará	115	113	89	81	76	58
North East	Rio Grande do Norte	67	60	50	39	38	34
North East	Paraíba	170	122	79	79	67	46
North East	Pernambuco	88	81	92	96	91	80
North East	Alagoas	99	87	83	74	76	45
North East	Sergipe	40	39	42	45	39	31
North East	Bahia	147	129	119	104	96	82
Southeast	Minas Gerais	194	173	154	147	142	119
Southeast	Espírito Santo	115	93	89	92	85	87
Southeast	Rio de Janeiro	116	87	81	63	58	53
Southeast	São Paulo	114	103	95	91	85	72
South	Paraná	214	197	193	197	201	141
South	Santa Catarina	178	159	142	135	123	93
South	Rio Grande do Sul	183	167	155	148	143	121
Midwest	Mato Grosso do Sul	116	106	91	97	91	79
Midwest	Mato Grosso	135	115	108	114	92	73
Midwest	Goiás	140	124	104	85	74	64
Midwest	Distrito Federal	120	122	113	110	82	64



Graph 2. Historical series of average stay (year) of HF from January 2011 to June 2022

Rio Grande do Sul, Mato Grosso do Sul and Goiás increased over the period. The states of Espirito Santo, Rio de Janeiro, Mato Grosso decreased in 2019 and 2021. Among the probable explanations of the relevant differences between the states of the federation, the structural difference, and resources for health care, it is a central hypothesis (Chaves *et al*., 2017). Table 3, it is possible to identify the historical series of mean sat in hospital stay from HF in the periods of 2011, 2015, 2017, 2019 and 2021.

COVID-19 promoted a significant increase in lethality worldwide (Vieira *et al*., 2021), in addition to the increase from the pandemic, several countries also observed a significant increase in deaths from cardiovascular diseases (Vieira *et al*., 2021). Regarding HF lethality, it increased in the time interval from 2011 (10,00%) to 2019 (12.63%), with a significant increase from the year 2021 (13.69%) and 2022 (Jan/June: 13.47%). In Graph 3 it is possible to identify the historical series of the HF lethality rate, in the period from 2011 to 2022.

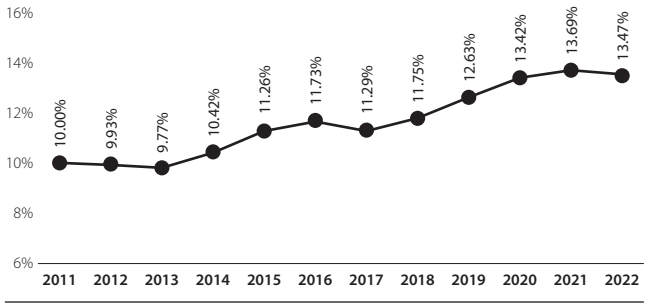
By observing this historical series of the mortality rate of HF by states of the Brazilian federation, one can perceive the worsening of the cases. In most Brazilian states, the increase in lethality follows the country's average data, except for the states of Mato Grosso, Mato Grosso do Sul and the Federal District. The data can be seen in Table 4.

Regarding the amounts spent by public health, from January 2011 to June 2022, there is a total sum of more than 725 million dollars (Trading Economics, 2022; DATASUS, 2022), being considered a relevant number of resources, for the reality of public health in the country. Graph 4 shows that it is possible to observe the historical series of the amounts spent on HF in Brazilian public health, year by year.

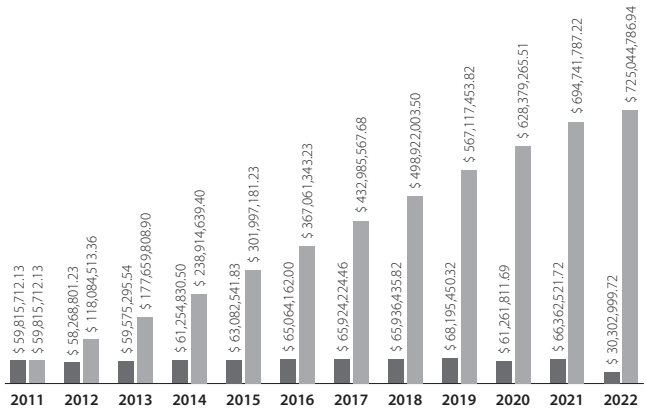
During this period, the average payment ticket for HF went from US$ 225.98 in 2011 to US$ 981.16 in 2022, representing a nominal growth of 59.24%. The average Period Ticket is shown in the chart 5.

Table 3. Average length of stay by state from HF in 2011, 2013, 2015, 2017, 2019 and 2021

Region	State	2011	2013	2015	2017	2019	2021
North	Rondonia	5.42	5.23	5.98	6.54	7.23	6.90
North	Acre	6.22	7.73	10.15	10.23	7.43	7.85
North	Amazonas	7.97	9.97	9.86	9.11	9.81	9.63
North	Roraima	9.99	8.49	9.11	9.22	9.82	15.68
North	Pará	6.66	6.88	7.21	8.08	7.37	8.20
North	Amapá	7.47	8.14	7.56	9.41	7.53	8.47
North	Tocantins	5.48	5.84	7.93	7.28	7.57	7.50
North East	Maranhão	4.69	5.05	5.68	5.72	6.79	8.00
North East	Piauí	4.38	4.73	4.87	5.08	5.40	4.66
North East	Ceará	7.42	7.66	9.58	11.04	10.74	11.06
North East	Rio Grande do Norte	9.29	8.25	9.86	9.41	9.79	9.47
North East	Paraíba	5.50	5.63	6.56	7.58	7.87	8.90
North East	Pernambuco	7.98	8.53	9.24	9.75	10.20	9.58
North East	Alagoas	6.81	6.89	7.20	7.13	7.54	8.23
North East	Sergipe	8.54	8.58	8.75	9.13	9.93	8.45
North East	Bahia	5.72	6.05	6.25	6.70	6.95	6.94
Southeast	Minas Gerais	6.52	6.73	6.98	7.34	7.46	7.48
Southeast	Espírito Santo	6.48	6.25	6.78	7.15	6.60	6.29
Southeast	Rio de Janeiro	8.08	8.93	9.56	10.88	10.64	10.03
Southeast	São Paulo	7.54	7.78	7.93	8.12	8.40	8.63
South	Paraná	4.68	4.99	5.02	4.93	5.03	5.58
South	Santa Catarina	5.88	6.05	6.24	6.12	6.15	6.80
South	Rio Grande do Sul	6.88	7.22	7.39	7.52	7.72	7.74
Midwest	Mato Grosso do Sul	5.48	5.57	6.13	6.32	6.71	6.80
Midwest	Mato Grosso	5.74	6.43	7.67	8.02	7.80	7.73
Midwest	Goiás	4.79	5.05	5.56	5.90	6.23	6.38
Midwest	Distrito Federal	10.80	11.03	10.25	10.37	12.04	11.97



Graph 3. Historical lethality series of HF 2011 to 2022



Obs. **Dark grey:** annual value; **Light gray:** accumulated value

Graph 4. Historical series of payments linked to HF from January 2011 to June 2022 (DATASUS, 2022)

If we consider the Health Price Adjustment Index in the Brazilian market (IPCA Health), in the same period, there is an adjustment of 89.70% (IBGE, 2022), as shown in Graph 6.

When relating the average ticket with the Health IPCA, in the same period, it is perceived that although in nominal terms, the average Ticket represents a growth of 59.24%, in real terms, when considering the price adjustment indexes of the same period, there is a 30.46% degrowth in the average ticket of HF visits from 2011 to 2022.

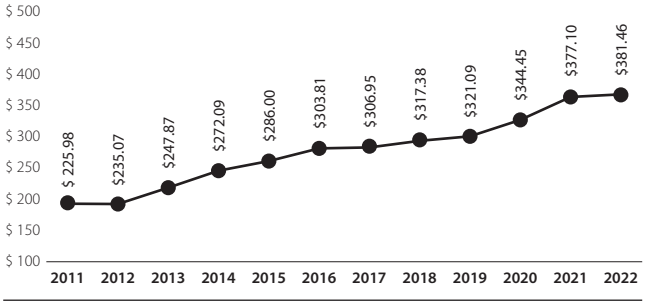
COVID-19 impact analysis

More specifically, to identify the impacts of COVID-19 on HF indicators, a total of 138 months were analyzed, with 111 months of the pre-COVID-19 period, from january 2011 to march 2020, and 27 months of the COVID-19 period, from april 2020 to june 2022. In Figure 1, it is possible to identify the monthly time series of hospitalizations, length of stay, lethality and medium ticket, whose analyses are presented in sequence. The temporal cut in the graphs takes place in March 2020, a period considered the initial contagion of COVID-19 in Brazil.

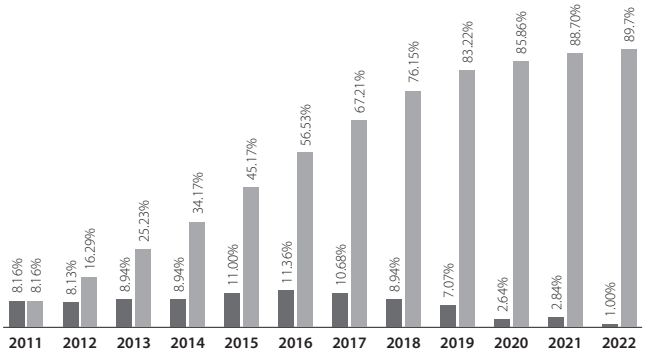
Regarding hospitalizations, the data showed a mean of 8.59 (SD 1.54) hospitalizations, with the lowest number of 4.75 in march 2021, and the highest of 12.06 in august 2011. When commencing the pre and COVID-19 period, there was a significant reduction in the number of

Table 4. Lethality rate by state for 2011, 2013, 2015, 2017, 2019 and 2021

Region	State	2011	2013	2015	2017	2019	2021
North	Rondonia	11.39%	10.90%	12.46%	14.09%	14.11%	12.99%
North	Acre	19.07%	9.90%	21.01%	15.84%	21.90%	18.98%
North	Amazonas	12.00%	8.31%	10.76%	13.28%	10.76%	16.22%
North	Roraima	8.96%	9.85%	10.64%	12.05%	20.32%	17.34%
North	Pará	6.98%	7.48%	8.55%	9.35%	9.21%	10.51%
North	Amapá	12.57%	7.78%	11.50%	14.99%	17.02%	9.49%
North	Tocantins	8.76%	8.28%	9.83%	9.37%	11.08%	11.10%
North East	Maranhão	9.11%	7.56%	8.15%	9.63%	10.81%	14.75%
North East	Piauí	6.58%	7.05%	7.27%	5.81%	7.22%	6.86%
North East	Ceará	8.66%	5.79%	9.21%	10.09%	12.01%	15.35%
North East	Rio Grande do Norte	14.36%	14.45%	17.18%	15.14%	17.85%	12.96%
North East	Paraíba	8.56%	9.76%	12.04%	11.05%	14.33%	15.99%
North East	Pernambuco	9.61%	9.82%	11.17%	10.54%	9.84%	11.35%
North East	Alagoas	18.06%	14.14%	13.30%	13.56%	13.48%	21.37%
North East	Sergipe	15.66%	20.77%	17.96%	14.81%	14.42%	19.03%
North East	Bahia	9.54%	8.83%	9.39%	11.06%	10.86%	11.83%
Southeast	Minas Gerais	9.45%	8.44%	8.94%	9.07%	9.92%	11.76%
Southeast	Espírito Santo	8.70%	7.49%	9.56%	10.11%	9.49%	9.83%
Southeast	Rio de Janeiro	11.73%	12.49%	14.43%	17.36%	18.01%	22.85%
Southeast	São Paulo	12.64%	12.75%	12.99%	13.80%	14.04%	15.88%
South	Paraná	7.00%	8.04%	7.91%	7.26%	7.57%	11.85%
South	Santa Catarina	8.00%	8.16%	8.45%	8.80%	9.66%	13.67%
South	Rio Grande do Sul	9.05%	9.47%	9.49%	10.33%	10.56%	13.28%
Midwest	Mato Grosso do Sul	9.68%	8.52%	9.67%	7.87%	9.99%	11.37%
Midwest	Mato Grosso	9.78%	10.90%	12.08%	10.22%	12.06%	11.94%
Midwest	Goiás	8.74%	7.71%	10.20%	9.48%	11.31%	12.67%
Midwest	Distrito Federal	10.41%	9.27%	9.91%	9.88%	7.69%	8.36%



Graph 5. Historical series of average ticket linked to HF from 2011 to 2022 (DATASUS, 2022)



Obs. **Dark grey:** annual value; **Light gray:** accumulated value

Graph 6. Historical series of price adjustment in Brazilian health index (IPCA Health) 2011 to 2022

hospitalizations for HF after the beginning of COVID cases in Brazil (Table 5). In the STI analysis, a negative inclination of hospitalizations was already visible in the pre-COVID-19 period (Figure 1), a decrease of -0.032 hospitalizations per month. A change in level was observed of -1.171, and a change in slope of 0.06 hospitalizations per month in the COVID-19 period (Table 6).

The cumulative median of the length of stay of patients hospitalized for HF was 7.3 (IQR 6.97 – 7.62) days, over 138 months. Being the lowest in december 2021 with a value of 6.3 days and the highest of 8.5 days in june 2022. In comparison between periods, length of stay increased in covid period (Table 5). In ITS, it was increasing in pre COVID by 0.012 days per month. A change in level of -0.603 days was observed, and a positive change in slope of 0.027 days per month in COVID period (Table 6).

The lethality rate averaged 0.109 (SD 0.014), with a maximum value of 0.15 in june 2021 and a minimum value of 0.083 in february 2012. Presenting an increase of 0.0274 which represents approximately 26% in the COVID period compared to pre period (Table 5). In the STI analysis, the lethality was a slight monthly increase of 0.00023 and had an abrupt increase in its level of 0.011 soon after the beginning of the pandemic, and maintened its pre COVID slope.

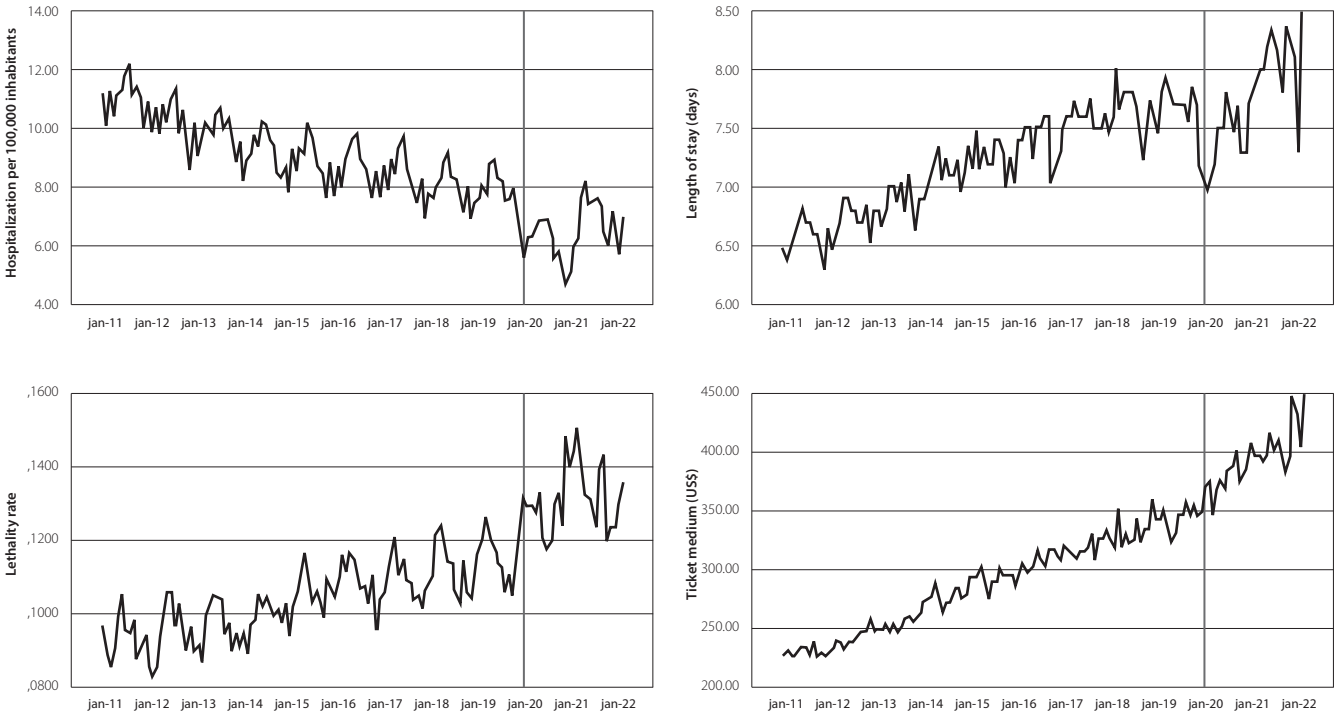


Figure 1. Monthly interrupted time series analysis

Table 5. Comparison of variables between periods

Variables	Pre period (SD, IQR)	Covid period (SD, IQR)	*p*
Hospitalizations per 100,000 inhabitants	9.10 (1.19)	6.48 (0.83)	< 0.001
Length of stay (days)	7.2 (6.8-7.6)	7.8 (7.3-8.1)	< 0.001
Lethality rate	0.1037 (0.009)	0.1311 (0.008)	< 0.001
Ticket medium (US$)	293.20 (248.57-321.20)	394.86 (375.48-403.02)	< 0.001

US$: American Dollar; SD: Standard deviation; IQR: Interquartile range.

Table 6. Interrupted time series analysis of variables

	Pre period coefficient (β0)	Pre period slope (β1)	*p*	Change in level (β2)	*p*	Slope change (β3)	*p*
Hospitalizations per 100,000 inhabitants	10.88	-0.032	< 0.001	-1.171	0.007	0.060	0.025
Length of stay (days)	6.55	0.012	< 0.001	-0.603	< 0.001	0.027	< 0.001
Lethality rate	0.091	0.00023	< 0.001	0.011	0.009	0.000017	0.949
Ticket medium (US$)	220.69	1.20	< 0.001	6.95	0.106	1.22	< 0.001

US$: American Dollar.

Finally, the median average ticket received by hospitals was US$ 307.36 (IQR 257,85 – 345,06) accumulated from 138 months. The minimum value was US$ 225.03 in january 2011 and the highest value of US$ 449.74 in june 2022. In the comparison between periods there is an increase of US$ 101.66, an increase of approximately 35% (Table 5). In ITS analysis, there was a monthly increase of US$ 1.20 in pre COVID period. No significant changes in level was observed, and a significant increase in slope by US$ 1.22 per month in covid period.

DISCUSSION

In general, it is perceived that the representativeness of the prevalence of HF cases with the SUS is decreasing in the last 10 years, with a more significant decrease after the advent of COVID-19. This factor may be related to the increase in the average rate of permanence and lethality in the pre-COVID-19 period, under the hypothesis that hospital care may be being triggered for care in more aggravated cases, which incurs

an increase in the time of in-hospital treatment and lethality (Vieira *et al*., 2021; Bromage *et al*., 2020). This intensity of reduction of hospitalizations may be associated, in Brazil, with a change in the standard of care of these patients, with increased referral to day hospitals and Emergency Care Units (ECU) at low and medium complexity levels.

About the advent of COVID-19, a significant increase in lethality can be clearly seen, even in the face of the decrease in hospitalizations, quantitatively confirming the evidence raised by research developed with the Unified Health System, mainly a reduction in elective cases (The Lancet, 2021) also covering the specialty of cardiology (Vieira *et al*., 2021; Severino *et al*., 2020). When analyzing the economic aspects of HF, in the period, one perceives the relevance of the expenses applied to HF, totaling more than 725 million dollars. Although the values are significant, the average ticket presents a clear decrease in investment per capita, with real devaluation of 30.46% in the period from 2011 to 2022, which may be related to two main hypotheses: increased effectiveness and cost analysis effectiveness of care (Loesch *et al*., 2020) and/or chronic underfunding of the Brazilian Public Health System (Paim *et al*., 2011; Rocha *et al*., 2021).

Therefore, the conjuncture of analyses made from the data show the care and economic importance of cardiology, more specifically HF before the population using the SUS, which although it presents a historical decrease in hospitalizations, has its lethality aggravated over time, especially in the post-covid period. Attention should also be given to the economic aspect of HF, which presents, as well as other pathologies (Loesch *et al*., 2021), a relevant expenditure on the SUS, which should be based on the improvement of the financing of complex specialties such as HF, thus avoiding the scrapping of health care, especially in regions of greater vulnerability (Chaves *et al*., 2017). Another important factor to be considered is the analysis of this scenario in countries of continental dimensions such as Brazil, which may present specific particularities in relation to HF health care in their different regions (Cruz *et al*., 2022).

Another relevant hypothesis is that hospitalized patients with COVID-19 could have decompensated HF, but that the hospital admission record was due to SARS-CoV-2 infection.

Finally, as a final consideration, it is worth highlighting the provocation of understanding HF health care in the Brazilian public context, whose purpose is to contribute to the access and qualification of health care, safeguarding cost-effectiveness assumptions (Loesch *et al*., 2021), quality (Gasparetto *et al*., 2019), humanization (Rodrigues *et al*., 2021) and access (Moreno *et al*., 2019), highlighting the role of the state and organized civil society, in the improvement of governance tools that guarantee, the rights and duties of all stakeholders, from an integrated view of health, in the most diverse specialties, regions and levels of care (IBGE, 2009).

CONCLUSION

Considering that there is an increase of approximately 240,000 new cases of HF in Brazil and that the mortality rate has been increasing over the years, one may be heading down a path of great difficulties. Based on the analyzes and results obtained, it can be concluded that heart failure in Brazil has worsened. Despite the reductions in hospitalizations, there was a significant increase in the average length of stay in hospitals, as well as an increase of more than 3 percentage points in the case fatality rate. Going further, the values of transfers for hospitalization are worrying in relation to inflation in the sector, in just over 10 years, a devaluation of transfers by 30.46%, generating a significant financial burden on hospitals.

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ANEXO 1

Para gráficos, tabelas e análises complementares, acesse:
https://docs.google.com/spreadsheets/d/1OH36u_5qOwfjfiJarGrmANAlBGufEw5q/edit#gid=1024264572

Ou, use o QR-Code ao lado.