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Short Communication

COVID-19 as the leading cause of hospital deaths in the Brazilian public health system in 2020

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ABSTRACT

Objectives: To describe the profile of hospital deaths in Brazil according to cause of admission during the pre-pandemic (2019) and pandemic periods (2020).

Methods: Descriptive study based on individual-level records of all hospital admissions with death outcomes reimbursed by the Brazilian National Health System in 2019 and 2020.

Results: The number of hospital deaths increased by 16.7% in 2020 compared with 2019 (522,686 vs 609,755). Coronavirus disease 2019 (COVID-19) was associated with 19.5% (118,879) of all hospital deaths in 2020, surpassing diseases of the circulatory system (15.4%, 93,735) and diseases of the respiratory system (14.9%, 91,035).

Conclusions: COVID-19 was the main cause of death in public hospitals in Brazil in 2020.

Introduction

As a consequence of the high death toll of coronavirus disease 2019 (COVID-19), some countries, such as the USA, have already reported COVID-19 as one of the leading causes of death in 2020 (Ahmad and Anderson, 2021). Since the beginning of the COVID-19 pandemic, Brazil has experienced a rapidly increasing number of cases and deaths (Castro et al., 2021b). In addition, COVID-19 has spread asymmetrically and unequally across social and economic groups, as well as geographic regions, in Brazil, with the most vulnerable populations and the Northeastern and Northern regions being the most affected (Dall'Alba and Rocha, 2021; Rocha et al., 2021). On this basis, this article presents and discusses data on the leading causes of death in public hospitals in Brazil in 2019 and 2020.

Methods

After extracting 1,132,441 records from all in-hospital deaths in 2019 and 2020 from the National Hospital Information System (SIH/SUS), deaths were classified by cause of admission based on the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10). Any admission including ICD-10 ('U07.1', 'U07.2', 'B97.2' or 'B34.2') (Tanno et al., 2020) or specific COVID-19 medical procedure codes ('0802010296', '0802010300', '0802010318' or '0303010223') (Brasil, Ministério da Saúde, Departamento de Informática do SUS, 2021) was classified as a 'COVID-19' admission. The data cover all the hospital deaths that occurred in 2019 and 2020 (from January to December). Descriptive statistics on patient characteristics (sex, age, ethnicity), severity of hospital admission (length of stay, intensive care unit admission) and geographic region are presented by cause of admission in 2019 and 2020.

All analyses were conducted in R language and based on de-identified individual-level data available on the hospitalization authorization repository (ftp://ftp.datasus.gov.br/dissemin/publicos/SIHSUS/200801_/Dados) at the end of August 2021.

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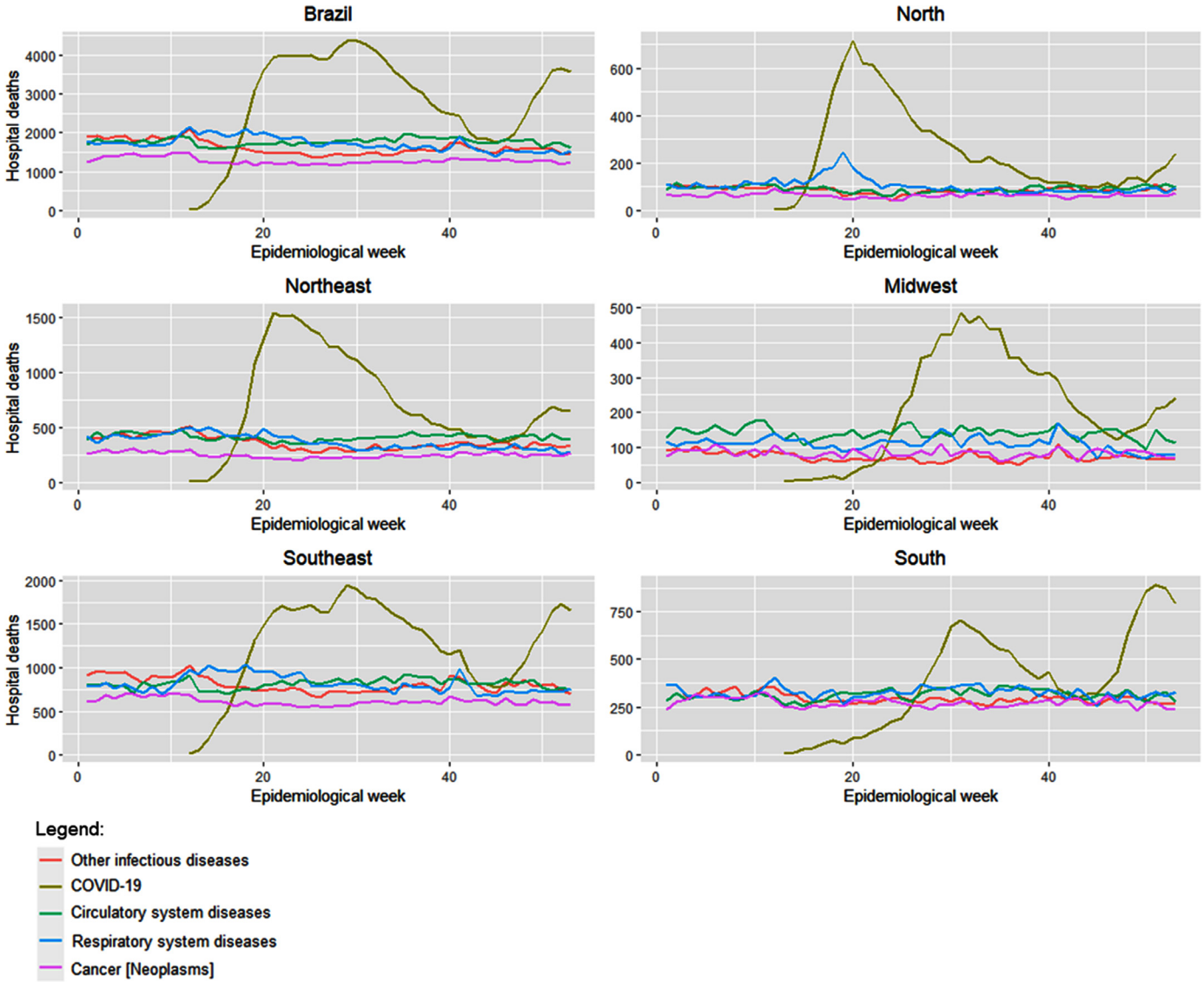

Figure 1. Timeline of leading causes of admission for deaths in public hospitals in Brazil from January 2020 to December 2020. COVID-19, coronavirus disease 2019.

Results

Diseases of the circulatory system were the leading cause of hospital death in 2019 (18.7%, 97,867), followed by infectious diseases (18.7%, 97,842), diseases of the respiratory system (18.7%, 97,585) and cancer (13.7%, 71,550) (Table 1). Compared with 2019, the total number of hospital deaths increased by 16.7% in 2020 (522,686 vs 609,755, respectively). Although this increase follows the trend of deaths related to COVID-19, there was a slight decrease in other causes of death, ranging from a 4.2% decrease in diseases of the circulatory system to a 12.3% decrease in other infectious diseases (excluding COVID-19). Figure 1 shows that although the death trends from other causes remained relatively stable throughout 2020, COVID-19 was the main cause of hospital death in Brazil by the 20th epidemic week (10–16 May 2020), except in the South and Midwest regions. By the end of 2020, COVID-19 was the main cause of hospital death (19.5%, 118,879), followed by diseases of the circulatory system (15.4%, 93,735), diseases of the respiratory system (14.9%, 91,035), other infectious diseases (14.1%, 85,830) and cancer (11.1%, 67,808).

Compared with 2019, the greatest increase in deaths was observed in patients aged 40–60 years and 60–79 years, representing 20.3% (123,565) and 44.8% (272,238) of all deaths in 2020, respectively. The number of hospital deaths related to COVID-19 among children and teenagers (0–19 years old) represented the smallest group compared with all other causes of death in 2020. Regarding ethnicity, the main increases in deaths were observed among blacks (33.9%), yellows (32.6%) and native Brazilians (30.9%). The black/brown group represented 39.8% (47,306) of the COVID-19 hospital deaths. The number of deaths in all length-of-stay groups increased in 2020, but a more pronounced increase was observed for admissions lasting 7–14 days (23.2%) and intensive care unit admissions (38,0%). However, it is noteworthy that half of the deaths due to COVID-19 occurred in hospitalizations with length of stay ≤7 days. Although the Southeast region had the highest proportion (44.3%) of hospital deaths due to COVID-19, the Northern region showed the greatest increase (31.58%) in the total number of hospital deaths.

Discussion

COVID-19 was the main cause of hospital death in public hospitals in Brazil in 2020, surpassing diseases of the circulatory system, diseases of the respiratory system, other infectious diseases

Table 1
Number of hospital deaths by cause of admission in public hospitals in Brazil in 2019 and 2020.

Cause	2019						2020						
	Circulatory system diseases	Infectious diseases	Respiratory system diseases	Cancer (neoplasms)	Other causes	Total	COVID-19	Circulatory system diseases	Respiratory system diseases	Infectious diseases	Cancer (neoplasms)	Other causes	Total
Sex													
Female	50,674	51,017	50,643	36,142	89,532	**278,008**	68,323	49,083	49,263	45,044	33,818	86,775	**332,306**
Male	47,193	46,825	46,942	35,408	68,310	**244,678**	50,556	44,652	41,772	40,786	33,990	65,693	**277,449**
Age range (years)													
0–19	983	3719	3055	1396	17,896	**27,049**	754	912	2072	2898	1272	17,257	**25,165**
20–39	3154	6094	3669	4200	13,551	**30,668**	5020	3320	4034	5519	3993	13,924	**35,810**
40–59	18,013	18,067	13,270	20,963	31,812	**102,125**	23,633	17,859	13,673	16,614	20,147	31,639	**123,565**
60–79	48,721	41,644	40,295	36,155	59,059	**225,874**	59,728	46,494	39,253	36,985	34,258	56,520	**273,238**
≥80	26,996	28,318	37,296	8836	35,524	**136,970**	29,744	25,150	32,003	23,814	8138	33,128	**151,977**
Ethnicity													
Black	4574	5268	3985	3704	7227	**24,758**	6905	4746	4998	4980	3977	7545	**33,151**
Brown	32,596	31,469	29,539	24,663	55,339	**173,606**	40,401	31,336	28,300	28,180	23,082	53,213	**204,512**
Native Brazilian	78	121	200	42	255	**696**	243	62	186	113	38	269	**911**
White	35,351	35,340	39,696	30,795	54,616	**195,798**	37,435	33,887	35,167	31,028	29,425	52,363	**219,305**
Yellow	2112	2504	2224	1046	3255	**11,141**	3968	2029	2204	2113	1026	3436	**14,776**
Not informed	23,156	23,140	21,941	11,300	37,150	**116,687**	29,927	21,675	20,180	19,416	10,260	35,642	**137,100**
Length of stay (days)													
≤7	64,998	53,658	61,475	43,874	102,199	**326,204**	60,051	63,440	59,117	48,174	43,185	100,637	**374,604**
7–14	17,550	22,034	19,814	14,686	29,235	**103,319**	32,204	16,495	17,859	19,100	13,884	27,729	**127,271**
>14	15,319	22,150	16,296	12,990	26,408	**93,163**	26,624	13,800	14,059	18,556	10,739	24,102	**107,880**
ICU admission													
No	61,832	58,812	70,708	57,661	98,519	**347,532**	50,694	57,395	63,190	49,880	54,346	92,573	**368,078**
Yes	36,035	39,030	26,877	13,889	59,323	**175,154**	68,185	36,340	27,845	35,950	13,462	59,895	**241,677**
Region													
Midwest	7525	4512	6383	4534	10,020	**32,974**	8841	7485	5834	3841	4445	9669	**40,115**
Northeast	23,530	22,679	22,436	14,115	39,851	**122,611**	30,534	21,597	19,384	19,032	13,086	38,412	**142,045**
North	5138	4529	5365	3182	9698	**27,912**	10,374	4761	5414	4480	3280	9512	**37,821**
Southeast	44,636	48,809	43,352	34,925	72,821	**244,543**	53,192	43,318	43,166	42,794	32,591	69,759	**284,820**
South	17,038	17,313	20,049	14,794	25,452	**94,646**	15,938	16,574	17,237	15,683	14,406	25,116	**104,954**
Total	**97,867**	**97,842**	**97,585**	**71,550**	**157,842**	**522,686**	**118,879**	**93,735**	**91,035**	**85,830**	**67,808**	**152,468**	**609,755**

ICU, intensive care unit.
aExcluding coronavírus disease 2019.

and cancer. Although accounting for hospital death data alone, this finding is in line with wider studies in other contexts, such as the study conducted by Ahmad and Anderson (2021) with provisional death records from the USA. However, instead of being the main cause of death, COVID-19 was the third leading cause of death in 2020 in the USA. This is a very worrying scenario, and the emergence of new variants may make the scenario even more worrying in 2021 (Abdool Karim and de Oliveira, 2021). As well as COVID-19, the number of hospital deaths due to diseases of the respiratory system was also important in 2020, suggesting the consequences of weak preparedness, such as low numbers of beds at public hospitals. Indeed, as a result of failing to mitigate the spread (Castro et al., 2021b), estimates also show the high impact of COVID-19 in terms of reducing overall life expectancy by 1.3 years in Brazil, highlighting the impact of local inequities (Castro et al., 2021a). In addition, the present results show disparities between ethnicities, which were observed and related to socio-economic status in previous analyses (Baqui et al., 2020; Castro et al., 2021b).

COVID-19 is likely to remain as one of the leading causes of death in 2021. In fact, civil registration data (ARPEN, 2021) already report COVID-19 as the main cause of death in Brazil in March 2021. None of the 2019 death records were classified as deaths due to COVID-19, suggesting a lack of misclassification. However, the study data are restricted to deaths that occurred in hospitals reimbursed by the SUS, and deaths that occurred in private hospitals, at home or in other settings were not included. These estimates can shed some light on the leading causes of hospital death in Brazil, and indicate the need for better strategies to prevent the direct and indirect effects of COVID-19 on the Brazilian population.

Conflict of interest statement

None declared.

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Ethical approval

All analyses were based on public data sets available to the public at large and not restricted to researchers. The records were all de-identified before being made public, and are available in SIH/SUS repository at ftp://ftp.datasus.gov.br/dissemin/publicos/SIHSUS/200801_/Dados.

Author contributions

Conceptualization: IRZ, MNS, ENS and LMPS.
Data curation: IRZ and LCA.
Formal analysis: IRZ and LCA.
Validation: FVC, GSF, IRZ, JJCE, MNS, ENS and LMPS.
Writing: FVC, GSF, IRZ, JJCE, MNS, ENS and LMPS.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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