

COVID in women in Brazil: length of stay and outcomes of first hospitalizations

COVID em mulheres no Brasil: tempo de permanência e status das primeiras internações

How to cite this article:

Pitilin EB, Lentsck MH, Gasparin VA, Falavina LP, Conceição VM, Oliveira PP, et al. COVID in women in Brazil: length of stay and outcomes of first hospitalizations. Rev Rene. 2021;22:e61049. DOI: <https://doi.org/10.15253/2175-6783.20212261049>

-  Erica de Brito Pitilin¹
 Maicon Henrique Lentsck²
 Vanessa Aparecida Gasparin³
 Larissa Pereira Falavina⁴
 Vander Monteiro da Conceição¹
 Patrícia Pereira de Oliveira⁵
 Tatiane Baratieri²

¹Universidade Federal da Fronteira Sul.
Chapecó, SC, Brazil.

²Universidade Estadual do Centro-Oeste.
Paraná, PR, Brazil.

³Universidade do Estado de Santa Catarina.
Chapecó, SC, Brazil.

⁴Universidade de São Paulo.
São Paulo, SP, Brazil.

⁵Universidade Comunitária de Chapecó.
Chapecó, SC, Brazil.

Autor correspondente:

Erica de Brito Pitilin
Avenida Fernando Machado, 108 E, Centro
CEP: 89801-501. Chapecó, SC, Brazil.
E-mail: erica.pitilin@uffs.edu.br

EDITOR IN CHIEF: Ana Fatima Carvalho Fernandes
ASSOCIATE EDITOR: Viviane Martins da Silva

ABSTRACT

Objective: to analyze the length of hospital stay and outcomes of the first hospitalizations due to COVID-19 of women at the beginning of the pandemic. **Methods:** ecological study with data on COVID-19 hospitalizations of women. Data classification was done by states, regions, age, length of hospital stay, main and secondary diagnosis (underlying diseases), and outcome. Kruskal-Wallis, Mann-Whitney, and chi-square tests were used for the analysis. **Results:** the Southeast region had the highest number of hospitalizations (0.6%). Of the total number of hospitalizations, 14.6% required an intensive care unit. The length of hospital stay of women over 50 years was significant for Brazil ($p<0.001$). There was an association between length of hospital stay and levels 2 and 3 of comorbidity. Deaths in women over 50 years old were significant in Brazil, Northeast, and Southeast ($p<0.001$). **Conclusion:** women over 50 years old with comorbidities are associated with longer hospital stays and deaths.

Descriptors: Hospitalization; Length of Stay; Coronavirus Infections; Intensive Care Units; Women.

RESUMO

Objetivo: analisar o tempo de permanência hospitalar e *status* das primeiras internações por COVID-19 em mulheres no início da pandemia. **Métodos:** estudo ecológico com dados das internações por COVID-19 em mulheres. Os dados foram estratificados por estados, regiões, idade, tempo de permanência hospitalar, diagnóstico principal e secundários (comorbidades) e desfecho da internação. Utilizaram-se os testes de Kruskal-Wallis, Mann-Whitney e qui-quadrado para a análise. **Resultados:** a região Sudeste teve o maior número de internações (0,6%). Do total de internações, 14,6% necessitaram de unidade intensiva. O tempo de permanência hospitalar em mulheres acima de 50 anos foi significativo para o Brasil ($p<0,001$). Houve associação entre tempo de permanência hospitalar e níveis 2 e 3 de comorbidade. Óbitos em mulheres com mais de 50 anos foi significativo no Brasil, Nordeste e Sudeste ($p<0,001$). **Conclusão:** mulheres com mais de 50 anos e com comorbidades estão associadas ao maior tempo de internação hospitalar e óbitos.

Descritores: Hospitalização; Tempo de Internação; Infecções por Coronavírus; Unidades de Terapia Intensiva; Mulheres.

Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infections have spread fast from China in Wuhan, Hubei province, to other parts of the world⁽¹⁾, creating concerns among health authorities in several countries on how to ensure care for the population in their health services. The virus causing coronavirus disease (COVID-19) has already infected more than 30.6 million people and 950,000 deaths have been reported to the World Health Organization by September 20th, 2020, emphasizing the need for mass testing and control actions⁽²⁾.

Evidence suggests that person-to-person infection has been in progress without effective drugs or vaccines so far, and the incubation period can reach up to 15 days⁽³⁻⁴⁾. When the cases were partially controlled in China, Europe stood out by the number of cases, and was considered the epicenter of the pandemic, followed by the United States, Brazil, and other countries in Latin America. Until September 19th, Brazil had 4,582,240 confirmed cases of COVID-19 and a total of 136,532 deaths (2.9%)⁽⁵⁾. The rapid growth curve of the contagion of the virus associated with the characteristic conditions of a developing country, of medium to low income such as Brazil, may result in a higher incidence of hospitalizations and deaths when compared with the characteristics of developed countries, a consequence of the difficulty in access to specialized health services, little mass testing of the population and problems in the infrastructure of the public health system⁽⁶⁾.

The severity with which COVID-19 affects some people makes them more susceptible to hospital admissions. Some studies of hospitalized patients from the general population have been reported, with little information related to the outcomes of hospitalizations of women infected with the new coronavirus⁽⁷⁾. When analyzing the published literature on COVID-19 and women, information gaps were identified, namely, being a woman means greater susceptibility to infection, the severity of the clinical condition, having adverse events?

The dilemma on the effect of clinical symptoms and/or length of stay in women is rising, since there were few serious and fatal cases in this specific group reported in studies from Italy, New York, China, and 14 states in the United States to date^(4,8-11). In Brazil, women's health has been addressed in public policies, and knowing the profile and length of stay of hospitalizations in the Unified Health System can be helpful in the context of assistance to women, especially in this pandemic scenario.

Given that the hospital stay may vary in different health services and the existence of individual peculiarities, it is justified to estimate the impact of these characteristics on the age group and the hospital stay of the first women infected by COVID-19, to, promptly, direct management strategies to the assistance of this population. In this sense, we sought to answer the following research question: What is the length of hospital stay of the first hospitalizations due to COVID-19 of women in Brazil? What is the outcome of these admissions according to the states of Brazil, level of underlying diseases, and deaths? Thus, the established objective was to analyze the length of hospital stay and outcomes of the first hospitalizations due to COVID-19 of women at the beginning of the pandemic.

Methods

This is an ecological study. The population was composed of female people affected by COVID-19 and whose hospital admissions were financed by the Unified Health System. The records with mention of the female sex, the procedure performed, and the use of the Intensive Care Unit were selected. The selected procedure (03.03.01.022-3 - Treatment of infection by the new coronavirus - COVID-19) comprises the necessary actions for the clinical treatment of the inpatient diagnosed with COVID-19, and medications, orthoses, prostheses, and special medications were included in the procedure table⁽¹²⁾. Data were collection in the Hospital Information System of the Informatics Department of the Unified Health System (Sistema

Único de Saúde, in Portuguese) and encompasses all Brazilian states⁽¹³⁾. The hospitalization data started on April/20 for the Hospitalization Authorizations in the Hospital Information System and published on the website of the Department of Informatics of the Unified Health System in June 2020.

The data were classified by place of residence, age, length of stay in a general hospital and the Intensive Care Unit, main and secondary diagnosis, and the hospitalization outcome: discharge or death. For the place of residence, Brazilian states and regions were considered; for age, three age groups were considered: from 0 to 9 years old (comprising girls), from 10 to 49 years old (women of reproductive age) and 50 years old and more (middle-aged and elderly women).

For secondary diagnoses, the number of different underlying diseases in the same Hospitalization Authorization was considered to classify hospitalizations into levels, which were categorized as follows: level 1 (mention of the main diagnosis only); level 2 (main diagnosis + description of 1 to 3 secondary diagnoses) and level 3 (main diagnosis + description of more than 3 secondary diagnoses). For the outcome of hospitalization, discharge from hospital or death was considered.

The collection instrument was created by the authors and constituted Excel® spreadsheets that contained specific fields for each variable under study. Checking with Hospitalization Authorizations available in the Hospital Information System allowed access to the records of the selected period for each state of the Brazilian federation, except for the state of Acre, as it is unavailable.

Once the spreadsheets were organized, the hospitalizations of women due to COVID-19 were analyzed using absolute and percentage frequencies. Both steps were carried out by the research team. Yet, to assess the effect of the age group and number of comorbidities on the length of hospital stay, variance analysis was through Kruskal-Wallis and Mann-Whitney tests, considering the non-normality of the data using the

Shapiro-Wilk test. To identify the difference between the groups, pairwise comparison of rank averages of the groups was carried out by the Mann-Whitney test with a p-value adjusted by the Bonferroni test.

The dependent variable was the length of hospital stay in days and the outcomes of hospitalizations: discharge or death. The independent variables were age groups, levels of underlying diseases, Brazilian regions, and hospital unit (general inpatient unit and in the Intensive Care Unit). To identify the association of age with outcomes, the chi-square test or Fischer's exact test was also performed, when expected values were lower than 5. In the analyzes of this study, the significance level of 5% was adopted. Thus, the averages of stay and proportion of hospital mortality by COVID-19 were calculated, using the Statistical Package for the Social Sciences software, version 20.0. During the grouping of Hospitalization Authorizations, a loss of 106 admissions was detected due to lack of registration.

Since it is research from secondary databases, whose information is grouped, without the chance of individual identification, the analysis by the Ethics Committee in Research with Human Beings was dismissed, under Resolution No. 510/2016.

Results

A total of 428,573 female hospitalizations were found, 1,760 with COVID-19, and of these, 257 (14.6%) using the Intensive Care Unit. The first hospitalizations due to COVID-19 of women in Brazil, through the Unified Health System, were 0.4% of the 428,573 Hospitalization Authorizations stated on April 2020. Among the Brazilian regions, the highest percentage was in the Southeast region, (0.6%) mostly in the states of Rio de Janeiro (1.3%) and São Paulo (0.7%), followed by the Northeast (0.4%), with (1.0%) in Pernambuco, and North, (0.3%) being on Amazonas (0.7%).

The evaluation of the first severe cases of CO-

VID-19 of women in Brazil showed that 1,760 (14.6%), needed support in the Intensive Care Unit. The Northeast Region had the highest proportion of hospitalizations that required intensive support (23.5%).

Concerning the states, Espírito Santo stands out, with more than half of hospitalizations requiring intensive support (66.7%), followed by Paraná (43.9%) and Bahia (41.8%) as shown in Table 1.

Table 1 – Distribution of hospitalizations for all causes, due to COVID and due to COVID in the Intensive Care Unit, according to regions and states. Chapecó, SC, Brazil, 2020

Region/State	*All causes	COVID	COVID in Intensive Care Unit
	n (%)	n (%)	n (%)
Brazil	428,573 (100.0)	1,760 (0.4)	257 (14.6)
North	27,198 (6.3)	92 (0.3)	10 (10.9)
Amazonas	7,579 (1.8)	51 (0.7)	1 (2.0)
Pará	8,798 (2.1)	12 (0.1)	0 (0.0)
Tocantins	3,873 (0.9)	2 (0.1)	0 (0.0)
Rondônia	3,399 (0.8)	18 (0.5)	9 (50.0)
Roraima	2,046 (0.5)	0 (0.0)	0 (0.0)
Amapá	1,503 (0.4)	9 (0.6)	0 (0.0)
Acre	0 (0.0)	0 (0.0)	0 (0.0)
Northeast	112,931 (26.4)	434 (0.4)	102 (23.5)
Bahia	28,962 (6.8)	67 (0.2)	28 (41.8)
Ceará	19,655 (4.6)	93 (0.5)	5 (5.4)
Pernambuco	19,304 (4.5)	190 (1.0)	53 (27.9)
Maranhão	12,786 (3.0)	45 (0.4)	15 (33.3)
Alagoas	7,416 (1.7)	0 (0.0)	0 (0.0)
Rio Grande do Norte	7,331 (1.7)	9 (0.1)	0 (0.0)
Paraíba	6,849 (1.6)	12 (0.2)	0 (0.0)
Piauí	6,197 (1.4)	16 (0.3)	1 (6.3)
Sergipe	4,431 (1.0)	0 (0.0)	0 (0.0)
Southeast	175,288 (40.9)	1,062 (0.6)	114 (10.7)
São Paulo	90,082 (21.0)	626 (0.7)	77 (12.3)
Minas Gerais	46,650 (10.9)	43 (0.1)	8 (18.6)
Rio de Janeiro	28,505 (6.7)	384 (1.3)	23 (6.0)
Espírito Santo	10,051 (2.3)	9 (0.1)	6 (66.7)
South	76,711 (17.9)	144 (0.2)	29 (20.1)
Paraná	30,459 (7.1)	57 (0.2)	25 (43.9)
Rio Grande do Sul	28,463 (6.6)	51 (0.2)	2 (3.9)
Santa Catarina	17,789 (4.2)	36 (0.2)	2 (5.6)
Midwest	36,445 (8.5)	28 (0.1)	2 (7.1)
Distrito Federal	11,460 (2.7)	22 (0.2)	2 (9.1)
Goiás	11,039 (2.6)	4 (0.0)	0 (0.0)
Mato Grosso do Sul	7,483 (1.7)	1 (0.0)	0 (0.0)
Mato Grosso	6,463 (1.5)	1 (0.0)	0 (0.0)

Source: Hospital Information System

Regarding the age groups, all regions showed a significant difference in the length of hospital stay, except for the North. The paired comparisons showed that the length of hospital stay in women was statistically longer in the age group above 50 years, for

Brazil (943.86) and the Northeast (243.98), Southeast (559.04), South (81.48), and Midwest (19.41) regions. There was no statistically significant difference for the length of hospital stay in the Intensive Care Unit between the age groups analyzed, as shown in Table 2.

Table 2 – Length of hospital stay (general and Intensive Care Unit) of women positive for COVID-19 according to age group and regions. Chapecó, SC, Brazil, 2020

Regions*	COVID-19					
	Length of hospital stay			Length of hospital stay in Intensive Care Unit		
	n (%)	Average Rank	p-value	n (%)	Average Rank	p-value
Brazil (years)			<0.001 [‡]			0.344 [‡]
0 to 9-	34 (1.9)	749.84		1 (0.4)	220.50	
10 to 49	662 (37.6)	785.38		75 (29.2)	123.03	
≥50	1,064 (60.5)	943.86 [‡]		181 (70.4)	130.97	
North			0.625 [‡]			0.728 [§]
0 to 9	2 (2.2)	28.50		-	-	
10 to 49	39 (42.4)	46.91		3 (30.0)	6.00	
≥50	51 (55.4)	46.89		7 (70.0)	5.29	
Northeast			<0.001 [‡]			0.244 [‡]
0 to 9	21 (4.8)	169.36		1 (1.0)	97.50	
10 to 49	178 (41.0)	188.22		33 (32.4)	48.52	
≥50	235 (54.1)	243.98 [‡]		68 (66.7)	52.27	
Southeast			<0.001 [‡]			0.895 [§]
0 to 9	9 (0.8)	575.00		-	-	
10 to 49	373 (34.1)	480.23		28 (24.6)	58.21	
≥50	680 (64.0)	559.04		86 (75.4)	57.27	
South			0.004 [‡]			0.543 [§]
0 to 9	2 (1.4)	32.75		-	-	
10 to 49	55 (38.2)	59.75		11 (37.9)	13.77	
≥50	87 (60.4)	81.48 [‡]		18 (62.1)	15.75	
Midwest			0.011 [§]			-
0 to 9	-	-		-	-	-
10 to 49	17 (60.7)	11.32		-	-	-
≥50	11 (39.3)	19.41		2 (100.0)	1.50	-

*Source: Hospital Information System. [‡]Kruskal-Wallis test; [§]Mann-Whitney test; ^{||}Similarity between the length of stay averages

The comparison of the average rank number of days of hospital stay of women hospitalized due to COVID-19, with different levels of underlying diseases, showed a statistically significant difference for levels 2 (average rank = 988.22) and 3 (average rank = 1.225,94) (p<0.001). It was observed that women with high levels of underlying diseases associated with the main diagnosis of COVID-19 had a longer hospital stay, as observed in the 90th percentile of hospital stay.

(level 1: 10.0; level 2: 13.0; level 3: 20.6).

In the comparison between the hospitalization outcomes (death and discharge) and the age group, it was observed that there is an association between death and the age of women hospitalized by COVID-19 in Brazil, and in the Northeast, and Southeast regions (p<0.001), and North (p=0.016). For these regions, the number of deaths was associated with women over 50 years old, as described in Table 3.

Table 3 – Analysis of the outcomes of admissions of women with COVID-19 in the second age group and Brazilian regions. Chapecó, SC, Brazil, 2020

Regions*	Total	Death	Discharge	p-value
	n (%)	n (%)	n (%)	
Brazil (years)				<0.001 [†]
0 to 9	34 (1.9)	2 (0.5)	32 (2.3)	
10 to 49	662 (37.6)	49 (13.1)	613 (44.2)	
≥ 50	1,064 (60.5)	322 (86.5)	742 (53.5)	
North				0.016 [‡]
0 to 9	2 (2.2)	-	2 (2.4)	
10 to 4	39 (42.4)	-	39 (47.0)	
≥ 50	51 (55.4)	9 (100.0)	42 (50.3)	
Northeast				<0.001 [†]
0 to 9	21 (4.8)	2 (1.9)	19 (5.8)	
10 to 49	178 (41.0)	15 (14.0)	163 (49.8)	
≥ 50	235 (54.1)	90 (84.1)	145 (44.3)	
Midwest				0.050 [‡]
0 to 9	-	-	-	
10 to 49	17 (60.7)	-	17 (68.0)	
≥ 50	11 (39.3)	3 (100.0)	8 (32.0)	
Southeast				<0.001 [‡]
0 to 9	9 (0.8)	-	9 (1.1)	
10 to 49	373 (35.1)	31 (12.8)	342 (41.8)	
≥ 50	680 (64.0)	212 (87.2)	468 (57.1)	
South				0.599 [‡]
0 to 9	2 (1.4)	-	2 (1.5)	
10 to 49	55 (38.2)	3 (27.3)	52 (39.1)	
≥ 50	87 (60.4)	8 (72.7)	79 (59.4)	

*Source: Hospital Information System; [†]Chi-square; [‡]Fischer's exact

Discussion

Although this study underpins scientific data about the importance of identifying the age group of Brazilian women with COVID-19, filling out hospitalization authorizations showed flaws, lacking information on secondary diagnoses, resulting in the non-accuracy of women with such diagnoses, becoming a study limitation. This limitation reflects the need to improve hospital information recording processes in the country. It is also worth mentioning that the data in question refer to April/2020, thus the first available hospitalizations, which may not reflect the total reality experienced in Brazil.

Even so, the results achieved may provide subsidies to guide the elaboration of health care strategies for women in each region of the country, among them the adequate distribution of hospital beds, the length of stay, the flow management of these patients, and health care offered mainly by nurses who are at the frontline of combating the pandemic.

The first hospitalizations due to COVID-19 in women in Brazil showed a disparity regarding the federal regions of the country. This fact may be related to differences in the speed of spread of the virus, universal testing, infrastructure of health services, increased or reduced capacity of beds in the Intensive Care Unit, adherence to social isolation strategies, among others, to a greater or lesser extent, depending on the level of regional development⁽¹⁴⁻¹⁶⁾. Considering the entire Brazilian territory, 30.0% of health regions are vulnerable and have morbidities above the national average, related to conditions similar to those presented by COVID-19⁽¹⁴⁾. Regional inequities linked to social hierarchies violate the principles of equity in health care⁽¹⁵⁻¹⁶⁾.

Nevertheless, the rise in cases of COVID-19 was expected, as well as the number of hospitalizations in the southeastern region, since it concentrates the largest population and is an expressively economically active region in the country⁽¹⁴⁾. Between February and March 2020, more than 800 thousand international passengers arrived in Brazil, with São Paulo being the destination of almost half (46.1%) of this population, followed by Rio de Janeiro (21.0%)⁽¹⁶⁾. Regions most affected by COVID-19 demand an increase in the use of health services, mainly hospital beds and Intensive Care Units.

In the current study, the number of hospitalizations of women over 50 years of age, as well as the length of hospital stay, was significant for Brazil and in all regions, except in the northern region. Younger and/or reproductive-age women are at lower risk for the complications of COVID-19⁽¹⁷⁾.

The literature points out that women affected by COVID-19 over the age of 48 years have an increase of 70.0% in the chances of continued hospital treatment,

when compared to younger people^(7,18), corroborating the findings of this study. Further, women of advanced age may have other pre-existing morbidities, such as obesity, diabetes, and hypertension, which are important risk factors for a negative outcome in the face of the new coronavirus^(17,19). On the other hand, no differences were observed in the length of hospital stay due to COVID-19 in the Intensive Care Unit and age, suggesting that the factors that interfere in the stay in this unit are mainly associated with the infection's critical condition of the respiratory complications, and not to age⁽⁴⁾.

The worsening of complications or death and, consequently, the recovery time was greater in women over 50 years of age. When analyzing the total of the first hospitalizations in women in Brazil in the Intensive Care Unit resulting from COVID-19, it was possible to identify a lower proportion when compared to the series of cases that occurred in 11 hospitals in New York, where 19% of women with positive SARS-CoV-2 were admitted to these units⁽²⁰⁾.

The risk of worsening of the COVID-19 infection is real and requires the necessary supplies for its intervention, especially beds in the Intensive Care Unit. Unfortunately, in the country, 142 health regions do not have an Intensive Care Unit bed in the Unified Health System, that is, 14.9% of the population do not have beds for intensive treatment, mainly in the North, Northeast, and Midwest regions⁽¹⁴⁾. In this study, the Northeast showed the highest proportion of hospitalizations of women due to COVID-19 who needed intensive support.

The association of secondary diagnoses with COVID-19 increased hospital stay. Morbidities such as pulmonary, cardiovascular, renal, liver, blood, and metabolic diseases were conditions that predisposed to complications resulting from COVID-19⁽¹²⁾. Studies suggest the occurrence of negative outcomes, major complications, and/or deaths due to COVID-19 when associated with other pre-existing diseases⁽¹⁷⁾.

The ratio of deaths of women over 50 years hospitalized by COVID-19 was significant for Brazil and in the Northeast and Southeast regions. These results

suggest that the characteristics of women who were hospitalized due to COVID-19 follow the profile of the general population with the aforementioned diagnosis in Brazil^(4,9-11). The effectiveness of the hospital care offered can also influence mortality, since interventions can change the hospitalization period⁽⁴⁾.

The study identified regions that have a higher number of hospitalizations and deaths of women due to COVID-19, as well as the affected age group, which is pertinent for the management of health services, concerning the occupation time per bed in pandemic times, as well as the formulation of strategies so that such events are minimized mainly within the scope of the Unified Health System. It is worth mentioning that the Brazilian public health system was and is responsible for most of the health actions throughout the pandemic.

Conclusion

A higher proportion of hospitalizations in women due to COVID-19 was found in the Southeast region, however, the Northeast region had a greater need for intensive support and deaths. It was identified that women over 50 and with a higher level of underlying diseases need a longer hospital stay. The initial epidemiological panorama analyzed shows that hospitalizations of women due to COVID-19 occurred in a heterogeneous manner among Brazilian regions and that the demand for specialized beds may increase, primarily, for those over 50 years old and/or with associated comorbidities, underpinning the need to increase the facilities and beds of Intensive Care Units.

Collaborations

Pitilin EB, Lentsck MH, Gasparin VA, Falavina LP, Conceição VM, Oliveira PP, and Baratieri T contributed to the design of the project, data analysis, and interpretation, writing of the article, relevant critical review of the intellectual content and the final approval of the version to be published.

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