DOI: https://doi.org/10.36489/saudecoletiva.2021v11i69p7000

Epidemiological profile of covid-19 and occupancy rate in the city of Fortaleza

Perfil epidemiológico da covid-19 e taxa de ocupação hospitalar na cidade de Fortaleza

Perfil epidemiológico da covid-19 y tasa de ocupación hospitalaria en la ciudad de Fortaleza

RESUMO
OBJETIVO: Descrever o perfil epidemiológico da COVID-19 e a taxa de ocupação hospitalar na cidade de Fortaleza. MÉTODO: Estudo descritivo, transversal, retrospectivo, de abordagem quantitativa, realizado a partir de dados coletados da plataforma Integra SUS Ceará sobre a COVID-19 em Fortaleza, no período de 19 de fevereiro de 2020 a 8 de março de 2021. RESULTADOS: No período analisado foram confirmados 129.280 casos de COVID-19, 55,04% (71.161) ocorreu no sexo feminino, foram registrados 5.028 óbitos sendo 56,89% (2.860) no sexo masculino. Estão ativos 1.810 leitos hospitalares para tratamento da COVID-19, a taxa de ocupação geral de leitos intensivos foi 92.70% (585). CONCLUSÃO: O estudo demonstra a intensa disseminação da SARS-CoV-2 na população de Fortaleza, os casos são mais frequentes no sexo feminino, contudo os óbitos são superiores no sexo masculino. A taxa de ocupação hospitalar de leitos intensivos adulto está crítica.
DESCRITORES: COVID-19; Epidemiologia; Mortalidade; Pandemia; Avaliação de Serviços de Saúde.

ABSTRACT
OBJECTIVE: To describe the epidemiological profile of COVID-19 and the hospital occupancy rate in the city of Fortaleza. METHOD: A descriptive, cross-sectional, retrospective study with a quantitative approach, based on data collected from the Integra SUS Ceará platform on COVID-19 in Fortaleza, from February 19, 2020 to March 8, 2021. RESULTS: No In the analyzed period, 129,280 cases of COVID-19 were confirmed, 55.04% (71,161) occurred in females, 5,028 deaths were registered, 56.89% (2,860) in males. 1,810 hospital beds are active for the treatment of COVID-19, the overall occupancy rate of intensive beds was 92.70% (585). CONCLUSION: The study demonstrates the intense dissemination of SARS-CoV-2 in the population of Fortaleza, cases are more frequent in females, however deaths are higher in males. The hospital occupancy rate of adult intensive care beds is critical.
DESCRIPTORS: COVID-19; Epidemiology; Mortality; Health Services Research; Pandemics.

RESUMEN
OBJETIVO: Describir el perfil epidemiológico del COVID-19 y la tasa de ocupación hospitalaria en la ciudad de Fortaleza. MÉTODO: Estudio descriptivo, transversal, retrospectivo con enfoque cuantitativo, basado en datos recolectados de la plataforma Integra SUS Ceará sobre COVID-19 en Fortaleza, del 19 de febrero de 2020 al 8 de marzo de 2021. RESULTADOS: En el período analizado se confirmaron 129.280 casos de COVID-19, 55.04% (71.161) ocurrieron en mujeres, se registraron 5.028 defunciones, 56.89% (2.860) en hombres. 1.810 camas de hospital están activas para el tratamiento de COVID-19, la tasa de ocupación general de camas intensivas fue del 92,70% (585). CONCLUSIÓN: El estudio demuestra la intensa diseminación del SARS-CoV-2 en la población de Fortaleza, los casos son más frecuentes en las mujeres, sin embargo las muertes son mayores en los hombres. La tasa de ocupación hospitalaria de las camas intensivas para adultos es crítica.
DESCRIPTORES: COVID-19; Epidemiología; Mortalidad; Investigación sobre Servicios de Salud; Pandemia.

RECEIVED: 12/10/2021 **APPROVED:** 15/11/2021

Renan Pereira da Silva
Graduated in Nursing - Ateneu University Center. Resident Nurse of Organ and Tissue Transplantation-General Hospital of Fortaleza.
ORCID: 0000-0003-3097-2153

Rosileide Gadelha Paes
Graduated in Nursing-University Center Ateneu.
ORCID: 0000-0002-4094-4618

Elizangela Maria Silva Freitas
Graduated in Nursing - Estácio University Center of Ceará. Care Nurse-Hospital Josefa Maria da Conceição.
ORCID: 0000-0002-1122-6959

Pedro Henrique do Vale Alves
Graduated in Nursing-University of Fortaleza. Post-Graduate Student in Intensive Care - University of Fortaleza. Researcher at the Research Center in Sapude da Criança.
ORCID: 0000-0002-4212-8198

Gessica Moreira Assunção
Graduated in Nursing-Ateneu University Center. Post-Graduate Student in Intensive Care - Ateneu University Center.
ORCID: 0000-0002-5728-0715

Cleriane Aderaldo Reis
Graduated in Nursing - Faculdade Nordeste. Postgraduate in Transplantation - Universidade Estadual do Ceará. Assistance Nurse-General Hospital of Fortaleza.
ORCID: 0000-0002-0596-6651

INTRODUCTION

COVID-19 is an infectious-contagious acute respiratory disease caused by the beta-coronavirus SARS-CoV-2 1 (Severe Acute Respiratory Syndrome Coronavirus 2). The average period for onset of symptoms is 2 to 7 days, SARS-CoV-2 infection may be asymptomatic or cause a wide spectrum of mild and severe symptoms such as fever, dry cough, fatigue, vomiting, diarrhea, anosmia, ageusia and dyspnea which can result in pneumonia, respiratory and multiple organ failure, and death. 2

The disease emerged in China in late 2019 and spread throughout the world, generating the biggest and most challenging public health crisis in the world today. 3 The first case in Brazil was identified on February 26th, 2020 and in March, community transmission of SARS-Cov-2 was identified, with an exponential increase in cases and deaths.4 The first epidemic wave of COVID-19 had a great impact on epidemiological indicators, socioeconomic determinants and on the health system. 5

SARS-CoV-2 underwent evolutionary processes generating several variants that travel the world. Viral mutations and combinations cause important clinical and epidemiological changes, such as greater severity, infectivity and transmissibility. 6 The new variant called VOC 202012/01 was identified in Brazil in 2021, it has greater transmission and incidence capacity, generating a great impact on the health system due to the high number of hospitalizations. 7 That same year, the second epidemic wave of COVID-19 emerged in Brazil.

The disease emerged in China in late 2019 and spread throughout the world, generating the biggest and most challenging public health crisis in the world today.

In December 2020, the B.167.2 (Delta) variant was identified in India, and in May 2021 the delta variant was already present in 43 countries, which is responsible for a high mortality, high viral load and increased transmission. 8

The dissemination of COVID-19 occurred in all Brazilian states, until April 2021 there were about 14 million confirmed cases and 370 thousand deaths. Ceará presents 622.765 cases and a mortality rate of 177,6. 9 The city of Fortaleza became the epicenter of the COVID-19 epidemic in Ceará. After a progressive period of reduction in cases, the second epidemic wave took place in early 2021, increasing the number of cases, deaths and hospitalizations, which put pressure on the care network. 10

The increased need for hospitalizations has had a direct impact on the health system, raising hospital occupancy rates to worrying levels. Bed occupancy in the Intensive Care Unit (ICU) in Ceará and Fortaleza reached 97% and 95% respectively in March 2021. The high numbers portray the collapse of the health care system for patients with COVID-19 who need com-

plex care. 11

Surveillance of respiratory transmission viruses is a strategy of great relevance to Brazilian public health due to the epidemic and pandemic potential that certain viruses have, thus monitoring and control of new etiological agents, such as the coronavirus, is essential. 12

The analysis of COVID-19 epidemiological indicators and the hospital occupancy rate represent an important strategy to know and understand the behavior that COVID-19 assumes in each health region, as well as the mode of impact on the health system and on the population . Considering the fluidity and complexity of the disease, the monitoring of epidemiological indicators allows for strategic planning, implementation of care and health control measures to fight the pandemic. Thus, this study aims to: Describe the epidemiological profile of COVID-19 and hospital occupancy rate in the city of Fortaleza.

METHOD

This is a descriptive, cross-sectional, retrospective study with a quantitative approach, carried out from secondary data collected from the government platform Integra SUS Ceará. This platform integrates epidemiological, hospital, outpatient and administrative monitoring and management systems of the Ceará State Health Department. 13

The epidemiological data collected are from February 19th, 2020 to March 8th, 2021 and reflect the total number of confirmed cases of COVID-19 in the city of Fortaleza. The data referring to the occupancy rate of active beds in the intensive care unit and infirmary for the treatment of COVID-19 are from March 8th, 2021 and reflect the current situation of the public and private health system providing care to COVID-19.

For data collection, a form built by the authors was used, which included data on the number of confirmed cases, investigated cases, incidence rate, number of deaths, mortality rate, lethality rate, and hospital occupancy rate from emergency care units were excluded due to non-compliance with information.

On the Integra SUS platform, data on the hospital occupancy rate per inpatient unit for adults, pregnant women and pediatric patients are only available as percentages. The actual numerical amount of active beds is shown by hospital unit and overall hospital occupancy for ward and ICU.

Data analysis and interpretation was performed using the Microsoft Excel version 2019 program, the data referring to the number of cases were grouped, generating a bar chart, with data separated by sex and age, thus allowing for comparison. Data on the number of deaths are shown in a column graph, being grouped by age group and sex. Data on hospital occupation were expressed in real numerical values, percentages and tabulated, thus allowing the crossing of variables. Since this is a research that uses secondary data, authorization from the research ethics committee was not necessary.

RESULTS

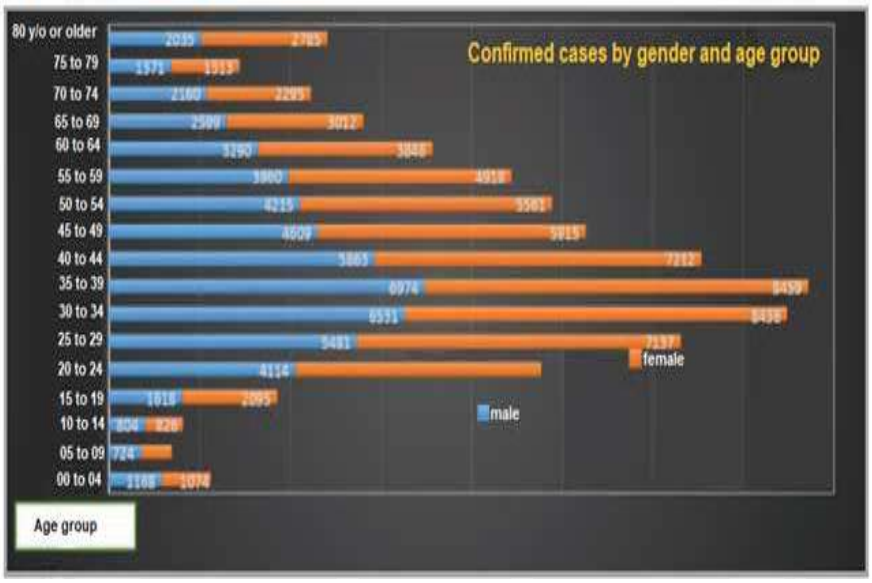
From February 19th, 2020 to March 8th, 2021, 459.278 cases of COVID-19 were reported in public and private health units in Fortaleza, and 129.280 cases of COVID-19 were confirmed during this period. The incidence per 100,000 inhabitants was 4.843,1. Of the total number of confirmed cases, 55,04% (71.161) occurred in females, 44,48% (57.516) in males and in 0,46% (603) of the cases the gender was not informed (Graph 1). According to the analyzed data, 48,52% (62.735) of the cases recovered from the disease and 23.192 are under investigation.

Of the total number of confirmed cases in the study period, 3,89% (5.028) evolved to death, with 56,89% (2.860) in males, 43,03% (2.163) in females, in 0,08% (4) of the deaths, the sex or age group was not informed (Graph 2). The mortality and lethality rates for 100.000 inhabitants are respectively 188,1 and 3,9.

Data referring to the panorama of hospital occupancy show that 1.810 hospital beds are active for COVID-19 in Fortaleza, there are 18 hospitals, nine public hospitals and nine private ones. There are 1.179 beds in the wards and 631 in the ICU.

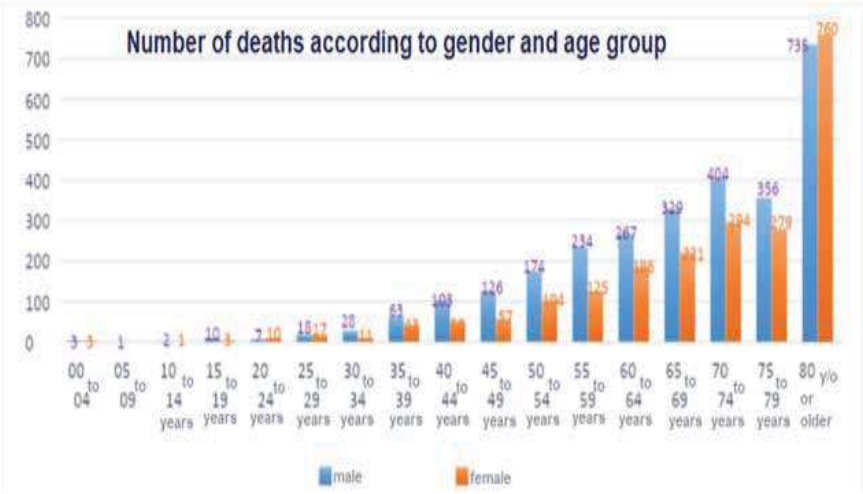
The panorama with the general occupancy rate of active beds shows that

Graph 1 - Confirmed cases of COVID-19 by age group and sex in the city of Fortaleza, Ceará, Brazil, 2021.



Source: Integra Sus Ceará, 2021.

Graph 2 – Distribution of deaths by COVID-19 according to age group and sex in the city of Fortaleza, Ceará, Brazil, 2020.



Source: Integra Sus Ceará, 2021.

92,70% (585) of the total ICU beds are occupied, with this percentage being 96,08% in the adult ICU, 75% in the ICU for pregnant women, 48,39% Child ICU and 40% neonatal ICU. The occupancy rate of ICU beds in public and private hospitals is respectively 95,32% (347) and 89,13% (238) (Table 1).

The overall occupancy rate of the ward beds was 90,33% (1.065), with 92,89% for the adult ward, 68,18% for the beds for pregnant women, 62,96% for the child beds and 90,48% for neonatal beds. The occupancy rate of ward beds in public and private hospitals is respectively 88,16% (529) and 92,57% (238) (Table 1).

DISCUSSION

The analyzes of epidemiological indica-

Table 1 - Distribution of active beds and hospital occupancy rate of the intensive care unit and ward for the treatment of COVID-19 in the city of Fortaleza, Ceará, Brazil, 2021.

N°	ACTIVE ICU BEDS	OCCUPIED ICU BEDS	ICU OCCUPANCY RATE	ACTIVE INFIRMARY BEDS	OCCUPIED INFIRMARY BEDS	INFIRMARY OCCUPANCY RATE
1*	10	10	100%	27	24	88.89%
2*	26	26	100%	114	114	100%
3*	20	18	90%	72	53	73.61%
4*	0	0	0%	30	30	100%
5*	154	144	93.51%	82	64	78.05%
6*	72	72	100%	126	126	100%
7**	14	14	100%	42	24	57.14%
8**	8	8	100%	107	94	87.85%
9**	60	55	91.67%	0	0	0%
10**	38	36	94.74%	13	13	100%
11**	10	6	60%	40	31	77.5%
12**	12	9	75%	88	81	92.05%
13**	10	0	0%	18	7	38.89%
14**	32	32	100%	93	93	100%
15**	145	137	94.48%	260	256	98.46%
16**	10	10	100%	59	50	84.75%
17**	2	0	0%	8	5	62.5%
18**	8	8	100%	0	0	0%
Total	631	585	92,71%	8	1068	90,58%

*public hospital **private hospital
Source: IntegraSUS Ceará, 2021.

tors show the intense presence of COVI-19 in the population of Fortaleza more than 1 year after the identification of the first case in the city. Until March 8th, 2021, 129.280 cases of COVID-19 were confirmed, it is noteworthy that women are the most infected by the virus, accounting for 55,04% (71.161) of cases. The economically productive population aged 15 to 64 years concentrates the highest number of cases, 81,7% (105.651), especially those aged between 35 and 39 years, which has the highest percentage of cases in both sexes 11,9% (15.405).

The number of cases in adolescents aged 10 to 19 years was 4,1% (5.343), a lower percentage was registered in the age group from 0 to 9 years, 2,8% (3.626). Cases in people aged 60 years or more represent 19,2% (24.870).

The percentage of deaths was higher in males 56,89% (2.860), and the percentage of deaths in females was only higher in the age group from 20 to 24 years old and from 80 years onwards. This trend was observed in an epidemiological study carried out in the Northeast, in which a higher percentage of COVID-19 was observed in women (52%) and a higher percentage of deaths in males (56%). 14

The predilection for males is a consistent feature of COVID-19. This aspect was observed in a worldwide statistical analysis, in which it was found that men more frequently present the severe form of COVID-19, have a higher risk of death and have three times more likely to need intensive treatment, this aspect is justified in part by the higher number of COVID-19 cases in men in this analysis. 15 However, in Fortaleza, the opposite is observed, women have a greater number of cases, opposing this justification.

Data analysis demonstrates a high percentage of deaths in people aged 60 years and over 75,9% (3.821). The data analyzed corroborate the conclusions obtained in research carried out in Mexico, China and Brazil, with a concentration of deaths in the elderly ranging from 52,7% to 89%. 16 In this way, it is clear that COVID-19 has a similar behavior in different populations and different territories. Among these similarities, the high number of deaths in the elderly population stands out. This aspect can be explained in part by the greater presence of comorbidities in this stage of life, as well as the greater difficulty in accessing health services in the city of Fortaleza, since this epidemic period has provided great demand for health services.

In the population aged between 20 and 59 years there were 1.170 (23,5%) deaths, and the low percentage of deaths in the population aged between 0 and 19 years 0,45% (23) is noteworthy. The low mortality observed in pediatric patients was observed in other studies, being associated with the mild form of SARS-Cov-2 infection, the severe form of infection in turn being related to coexisting conditions such as hydronephrosis and leukemia. 17

With regard to the panorama of hospital beds, 1.810 active beds are active, and public institutions in Fortaleza have a greater number of active beds in the ICU 57,6% (364) and wards 50,8% (600), it should be noted that in this period, there was an expansion of the public health care network.

The overall percentage of occupation of ICU beds was 92,70% (585), thus the close relationship with the high number of cases and deaths in adults can be seen, confirming the greater severity of the disease in this population, which justifies the high occupancy of intensive beds. It is noteworthy that until 2020 Brazil had 188 health regions without a public ICU, with 45,5% in the Northeast region, in addition 70% of the amount of ICU is below the ideal in public services in the Northeast. 18

On the other hand, pediatric and neonatal intensive beds have low occupancy, less than 50%, confirming the less serious nature of SARS-Cov-2 in this population.

Among the 17 hospitals analyzed that have active ICU beds, 8 have 100% of intensive beds occupied, and 5 are public hospitals. The great demand for public services means that these hospitals have a higher occupancy rate of intensive beds 95,32% (347), however when compared to private hospitals 89,13% (238) the difference is approximately 5%. The hospital occupancy rate is a fluid indicator that can be changed daily, so its monitoring is necessary to predict the possible collapse of the health system and thus allowing decision-making based on the situation currently presented.

CONCLUSION

The study demonstrates the intense spread of SARS-CoV-2 in the population of Fortaleza. Cases of COVID-19 are more frequent in females, with the economically active population being the most affected. Deaths are higher in males, it should be noted that the population over 60 years accounts for over 75% of deaths.

The second epidemic wave raised the hospital occupancy rate, the occupancy level of intensive care unit beds is critical, and demands for special attention to avoid the collapse of the critical patient care network.

REFERENCES

1. Esakandari H, Nabi-afjadi M, Fakkari-afjadi J, Farahmandian N, Miresmaeili S, Bahreini E. A comprehensive review of COVID19 characteristics. Biol Proced Online. 2020;22(19):1-10.

2. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Dease (COVID-19): A Review. JAMA. 2020;324(8):782-793.

3. Ministério da Saúde. Recomendações quanto à nova variante do SARS-CoV-2 no Brasil. Nota técnica Nº 59/2021. [Internet]. 2021 [acesso em 5 de Jun de 2021]. Disponível: https://www.gov.br/saude/pt-br/media/pdf/2021/fevereiro/02-1/nota-tecnica-recomendacoes-quanto-a-nova-variante-do-sars-cov-2-no-brasi.pdf.

4. Lima-Costa MF, Macinko J, Andrade FB, Souza JR. PRB, Vasconcellos MTL, Oliveira CM. Iniciativa ELSI-COVID-19: metodologia do inquérito telefônico sobre coronavírus entre participantes do Estudo Longitudinal

REFERENCES

da Saúde dos Idosos Brasileiros. Cad Saúde Pública. [Internet]. 2020;36 (Sup3):e00183120. [acesso em 20 de junho de 2021]. Disponivel em: https://www.scielo.br/j/csp/a/MtWLnpMvg3CHV8j5nG966hg/?lang=pt.

5. Perman G, Puga C, Ricci, Terrasa S. Daños colaterales de la pandemia por COVID-19: Consecuencias inevitables? Rev Hosp Ital B. Aires. 2020;40(4):185-190.

6. European Center for Disease Prevention and Control. (ECDC). Risk related to the spread of new SARS-CoV-2 variants of concern in the EU/EEA – first update, 21 January 2021. [Internet]. 2021 [acesso em 01 de maio de 2011]. Disponível em: hps://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-riskrelated-to-spread-of-new-SARS-CoV-2-variants-EU-EEA-first-update.pdf Acessado em: 30 Jan 2021.

7. Organização Pan-Americana de Saúde (OPAS) Atualização epidemiológica: Ocorrência de variantes de SARS-CoV-2 nas Américas. [Internet]. 2021 [acesso 20 de maio de 2011]. Disponível em: https://www.paho.org/pt/-variantes-sars-cov-2-nas-americas-20-janeiro021.

8. Lopez Bernal J, Andrews N, Gower C, Gallagher E, Simmons R, Thelwall S et Effectiveness of COVID-19 vaccines against the B.1.617.2 (Delta) Variant. N Engl Med. 2021; 385(7):585-594.

9. Brasil. Ministério da Saúde. Coronavirus Brasil [Internet]. 2021 [acesso 10 de abril de 2021]. Disponível em: https://covid.saude.gov.br/.

10. Secretaria Municipal de Saúde de Fortaleza. Informe semanal COVID-19: 18° semana epidemiológica de 2021. [Internet]. 2021 [acesso em 15 de maio de 2021]. Disponível em:

https://coronavirus.fortaleza.ce.gov.br/boletim-epidemiologico.html

11. Fundação Oswaldo cruz. Boletim Observatorio COVID-19, 23 de março de 2021: Colapso do sistema de saúde. [Internet]. 2021 [acesso em 15 de maio de 2021]. Disponível em: https://portal.fiocruz.br/portal.fiocruz.br/files/documentos/boletim_extraordinario_2021

12. Carvalho AD, Deus AAF, Trindade TCS, Tittonr AA. Perfil epidemiológicos dos casos de e óbitos por síndrome respiratória aguda grave confirmados por COVID-19. Rev Baiana de saúde pública. 2021;45(1):19-32.

13. Governo do Estado do Ceará. Integra SUS Ceará. 2021 [acesso em 20 de maio de 2021]. Disponível: https: //www.integra.saude.ce.gov.br.

14. Silva RP, Castro APGS, Silva FIG, Evangelista EC, Paes RG, Freitas JG. Cenário epidemiológico da COVID-19 no nordeste do Brasil. Saud Coletiv (Barueri) [Internet]. 2020 [acesso 10 de agosto de 2021];10(59):4420-9. Disponível em: http://revistas.mpmcomunicacao.com.br/index.php/saudecoletiva/article/view/1083.

15. Peckham H, Gruijter NM, Raine C, Radziszewska A, Ciurtin C, Wedderburn L et al. Male sex identifiedby global COVID-19 meta-analysis as a risk fator fot death and ITU admission. Nat commun. 2020;11:6317,1-10.

16. Escobar AL, Rodriguez TDM, Monteiro JC. Letalidade e características dos óbitos por COVID-19 em Rondônia: estudo observacional. Epidemiol Serv Saúde [Internet]. 2020 [acesso 02 de julho de 2021] 30(1):e2020763. Disponível em: https://www.scielo.br/j/ress/a/s9XR-5ZWVjtBJrNFJMK7khCf/?lang=pt.

17. Lu X, Zhang L, Du H, Zhang J, Li YY, Qu J, et al. SARS-CoV-2 infection in children. N Engl J Med. 2020;382(17):1663-5.

18. Moreira RS. COVID-19: unidade de terapia intensiva , ventiladores mecânicos e perfis latentes de mortalidade associados a letalidade no Brasil. Cad Saúde Pública. [Internet]. 2020 [acesso em 9 de agosto de 2021] 36(5)e:00080020. Disponível em: https://www.scielo.br/j/csp/a/NPz56K7Zys3fFDZdWHdcYWn/abstract/?lang=pt.