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Original Article

Epidemiological profile of patients hospitalized by covid-19 in an intensive care unit in the interior of Brazil

Perfil epidemiológico dos pacientes hospitalizados por COVID-19 em uma Unidade de Terapia Intensiva no interior do Brasil

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ABSTRACT: *Objective:* To describe the epidemiological profile of patients admitted by COVID-19 to the intensive care unit of a hospital in the interior of the northeastern countryside. *Methods:* Observational and retrospective study based on data from the electronic protocol of the service of patients admitted between April 24, 2020, and December 31, 2020. Data regarding gender, age, health insurance, need for orotracheal intubation and outcome were evaluated. *Results:* 118 patients were included in the study. Men were more affected than women. The mean age of patients was 65.35 years, with the mean age of women (70.53 years) being higher than the mean age of men (62.37 years). Regarding age group, the elderly accounted for 66.11% of patients. 48.31% of the patients required orotracheal intubation, of which 61.40% were male, with an outcome of death in 75.44% of the intubated patients. Of the total number of patients in the study, 40.68% died. *Conclusion:* Greater involvement and lethality were observed in men and in the elderly. The number of adult men admitted was triple the number of adult women admitted.

Keywords: Coronavirus infections; COVID-19; Epidemiology; Mortality.

RESUMO: *Objetivo:* Descrever o perfil epidemiológico de pacientes admitidos por COVID-19 em unidade de terapia intensiva em hospital de uma cidade do interior nordestino. *Métodos:* Estudo observacional e retrospectivo a partir de dados do protocolo eletrônico do serviço dos pacientes com admissão entre 24 de abril de 2020 e 31 de dezembro de 2020. Foram avaliados dados referentes a sexo, faixa etária, convênio, necessidade de intubação orotraqueal e desfecho. *Resultados:* Um total de 118 pacientes foram incluídos no estudo. Homens foram mais acometidos do que mulheres. A média de idade dos pacientes foi de 65,35 anos, sendo a média de idade das mulheres (70,53 anos) maior que a média de idade dos homens (62,37 anos). Em relação à faixa etária, os idosos corresponderam a 66,11% dos pacientes. 48,31% dos pacientes necessitaram de intubação orotraqueal, destes 61,40% eram do sexo masculino, com desfecho para óbito em 75,44% dos pacientes intubados. Do total de pacientes do estudo, 40,68% evoluíram para óbito. *Conclusão:* Observou-se maior acometimento e letalidade em homens e em idosos. A quantidade de homens adultos admitidos foi o triplo da quantidade de mulheres adultas admitidas.

Palavras-chave: Infecções por Coronavírus; COVID-19; Epidemiologia; Mortalidade.

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INTRODUCTION

In December 2019, a new strain of coronavirus called SARS-CoV-2 was identified in the city of Wuhan[1]. The disease caused by COVID-19 became known as Coronavirus 2019 (COVID-19). In light of its rapid spread around the world, the World Health Organization (WHO) declared COVID-19 an international public health emergency on January 30, 2020[2].

Most studies are concentrated in the capitals. There are few studies on the epidemiology of COVID-19 in cities in the interior of Brazil. However, the epidemiological profile of COVID-19 in capital cities may not represent the epidemiology of cities in the interior. The objective of this study is to describe the epidemiological characteristics of patients hospitalized for Covid-19 in a hospital in Petrolina-PE.

METHODS

This is an observational and retrospective study. The study was carried out with secondary data from an Intensive Care Unit (ICU) of a hospital located in Petrolina-PE. The following inclusion criteria were used: a) Age greater than 18 years; b) Admission to the ICU from April 24, 2020, to December 31, 2020; c) Diagnosis of Severe Acute Respiratory Syndrome (SARS); d) Patient provenly diagnosed with COVID-19. The profile of admissions to the ICU of the studied hospital covers patients in supplementary health (private health insurance) and complementary health (public care provided by the SUS). Patients who tested positive in the molecular RT-PCR test (reverse-transcriptase polymerase chain reaction), in serological tests or in immunochromatographic tests were included. Patients transferred to another health service, as well as patients who escaped from the unit, were excluded from the study.

The following variables were evaluated: a) total number of patients admitted to the intensive care unit; b) gender of the patients; c) age range of patients; d) agreement; e) need for orotracheal intubation (OTI); f) outcome (discharge or death).

The chi-square test and its p value were used for differences between proportions. For quantitative variables, Student's t test was used for the difference between means. The odds' ratio, its 95% confidence interval, for the outcomes of intubation and death, in relation to the independent variables, was calculated.

The project was approved by the Ethics Committee of the Federal Institute of Education, Science and Technology of Sertão Pernambucano - IF SERTÃO-PE under opinion number: 4.271.698.

RESULTS

There were 241 records registered in this unit, of which 118 met the defined inclusion and exclusion criteria, which were used as the study's sample space. Most admitted patients were residents of Petrolina/PE (n=51; 43.22%) and Juazeiro/BA (n=23; 19.49%), while 37.29% were from other cities in the Intermediate Geographic Region from Petrolina and from Juazeiro[3]. The urban area (n=105; 88.98%) had a higher number of patients than the rural area (n=13; 11.02%). In 2020, the estimated population of Petrolina was 354,317 inhabitants[4], with 18.06% of the population covered by health plans[5]. Of the admitted patients, 51 (43.22%) were transferred from other sectors of the hospital (emergency room, ward or apartments), while 67 (56.78%) were received from other hospital units in the region, mainly via the SUS Regulation System (48 patients). The number of elderly people was higher among patients with health plans (n=45; 70.31%) than among SUS patients (n=33; 61.11%). Most hospitalized patients were male (n=75; 63.56%), as shown in Table 1. During the study period, 57 patients (48.31%) required orotracheal intubation (OTI), most of them men. (n=35; 61.40%) or elderly (n=43; 75.44%); Elderly men accounted for 26 (45.61%) patients. Of this total number of male patients who required intubation, most died (n=24; 42.10%) as the outcome.

Most deaths occurred in males (n=27; 56.25%), affecting mainly elderly male patients (n=24; 50%). Contrary to the pattern observed in men, in the discharge outcome, there were more elderly women (n=16; 72.7%) than adult women (n=6; 27.2%). However, the mortality pattern was similar for both males and females: older adults had higher mortality rates than adults. The number of adult men (n=30; 75%) admitted was three times the number of adult women (n=10; 25%) admitted, as shown in Table 2. There was a higher mortality rate among patients admitted via the SUS Regulation System (n=29; 53.7%) than among Supplementary Health patients (n=19; 29.7%).

Table 1 - Distribution of intubated patients according to sociodemographic variables, Petrolina, 2020

Variable	Intubation		p-value	OR ($CI_{95\%}$)
	Yes n(%)	No n(%)		
Gender (All patients)			p=0.638	
F	22/43 (51.2%)	21/43 (48.8%)		1.200 (0.565; 2.540)
M	35/75 (46.7%)	40/75 (53.3%)		1.000
Total	57/118 (48.3%)	61/118 (51.7%)		
Age (All patients)			p=0.038	
Adults	14/40 (35.0%)	26/40 (65.0%)		0.438 (0.199; 0.964)
Elderly	43/78 (55.1%)	35/78 (44.9%)		1.000
Total	57/118 (48.3%)	61/118 (51.7%)		
Age (Male patients)			p=0.018	
Adults	9/30 (30.0%)	27/30 (70.0%)		0.313 (0.118; 0.834)
Elderly	26/45 (57.8%)	19/45 (42.2%)		1.000
Total	35/75 (46.7%)	40/75 (53.3%)		
Age (Female patients)			p=0.933	
Adults	5/10 (50.0%)	5/10 (50.0%)		0.941 (0.229; 3.870)
Elderly	17/33 (51.5%)	16/33 (48.5%)		1.000
Total	22/43 (51.2%)	21/43 (48.8%)		
Health insurance			p<0.001	
Supplementary	22/64 (34.4%)	42/64 (65.6%)		0.284 (0.133; 0.608)
SUS	35/54 (64.8%)	19/54 (35.2%)		1.000
Total	57/118 (48.3%)	61/118 (51.7%)		

p-value: Pearson's chi-square test; OR: odds ratio
$CI_{95\%}$: 95% confidence interval, F: Female; M: Male; Adult: 18-59 years-old
Elderly: ≥60 years-old; SUS: public health system

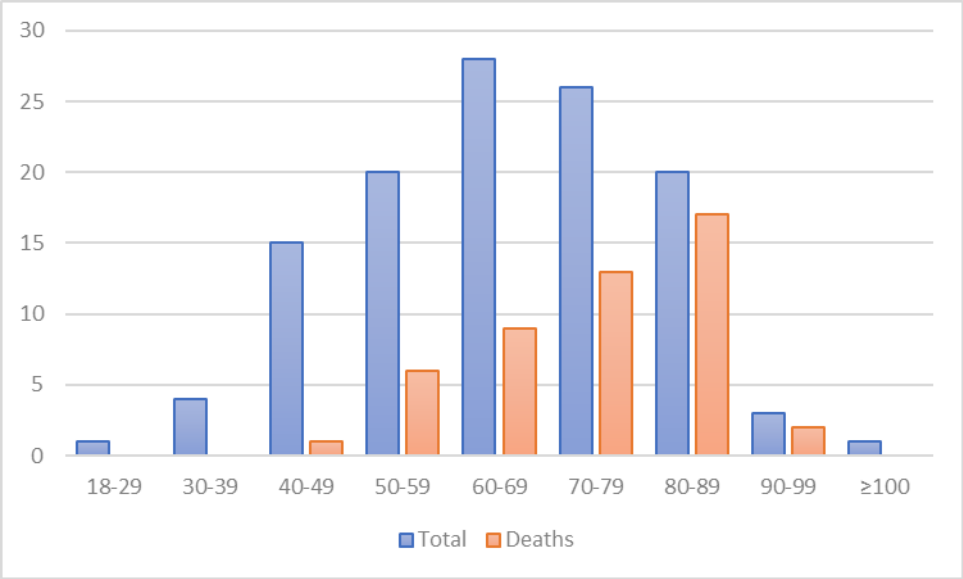
Table 2 - Distribution of patients by outcome, Petrolina, 2020

Variable	Outcome		p-value	OR ($CI_{95\%}$)
	Discharged n(%)	Deaths n(%)		
Gender (All patients)			p=0.172	
F	22/43 (51.2%)	21/43 (48.8%)		0.589 (0.275; 1.260)
M	48/75 (64.0%)	27/75 (36.0%)		1.000
Total	70/118 (59.3%)	48/118 (40.7%)		
Gender (Adults)			p=0.031	
F	6/10 (60.0%)	4/10 (40.0%)		0.167 (0.029; 0.948)
M	27/30 (90.0%)	3/30 (10.0%)		1.000
Total	33/40 (82.5%)	7/40 (17.5%)		
Gender (Elderly)			p=0.874	
F	16/33 (48.5%)	17/33 (51.5%)		1.080 (0.438; 2.640)
M	21/45 (46.7%)	24/45 (53.3%)		1.000
Total	37/78 (47.4%)	41/78 (52.6%)		
Age			p<0.001	
Adults	33/40 (82.5%)	7/40 (17.5%)		5.22 (2.06; 13.20)
Elderly	37/78 (47.4%)	41/78 (52.6%)		1.00
Total	70/118 (59.3%)	48/118 (40.7%)		
Health insurance			p=0.008	
Supplementary	45/64 (70.3%)	19/64 (29.7%)		2.75 (1.29; 5.86)
SUS	25/54 (46.3%)	29/54 (53.7%)		1.00
Total	70/118 (59.3%)	48/118 (40.7%)		
Intubation			p<0.001	
Yes	14/57 (24.6%)	43/57 (75.4%)		0.029 (0.010; 0.087)
No	56/61 (91.8%)	5/61 (8.2%)		1.000
Total	70/118 (59.3%)	48/118 (40.7%)		

p-value: Pearson's chi-square test; OR: odds ratio
$CI_{95\%}$: 95% confidence interval, F: Female; M: Male; Adult: 18-59 years-old
Elderly: ≥60 years-old; SUS: public health system

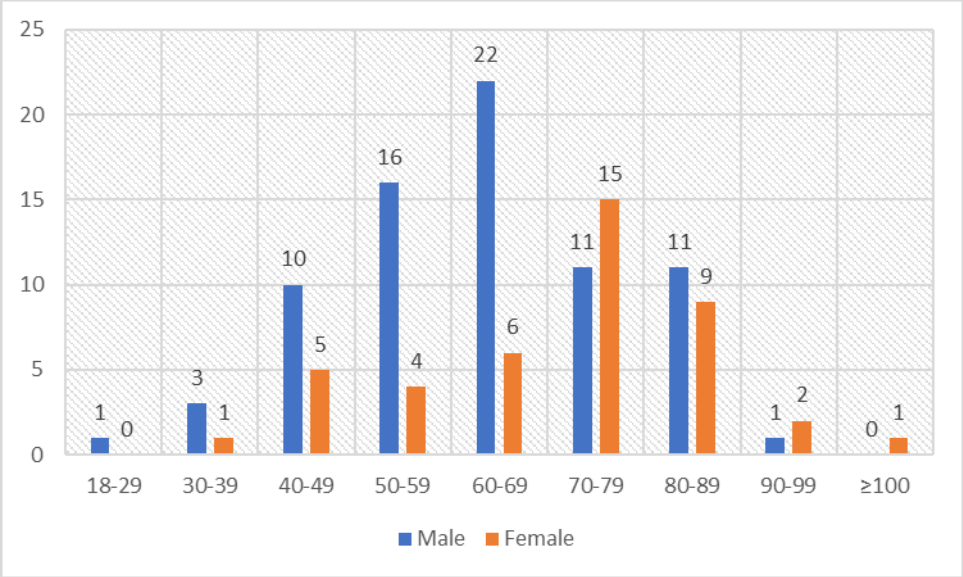
The number of patients affected by age group increased up to the seventh decade of life, as shown in Graph 1. After the seventh decade of life, the pattern of involvement across age groups decreased. Meanwhile, the number of deaths increased until the ninth decade of life.

Graph 1 – Total number of patients and deaths by age group, Petrolina, 2020



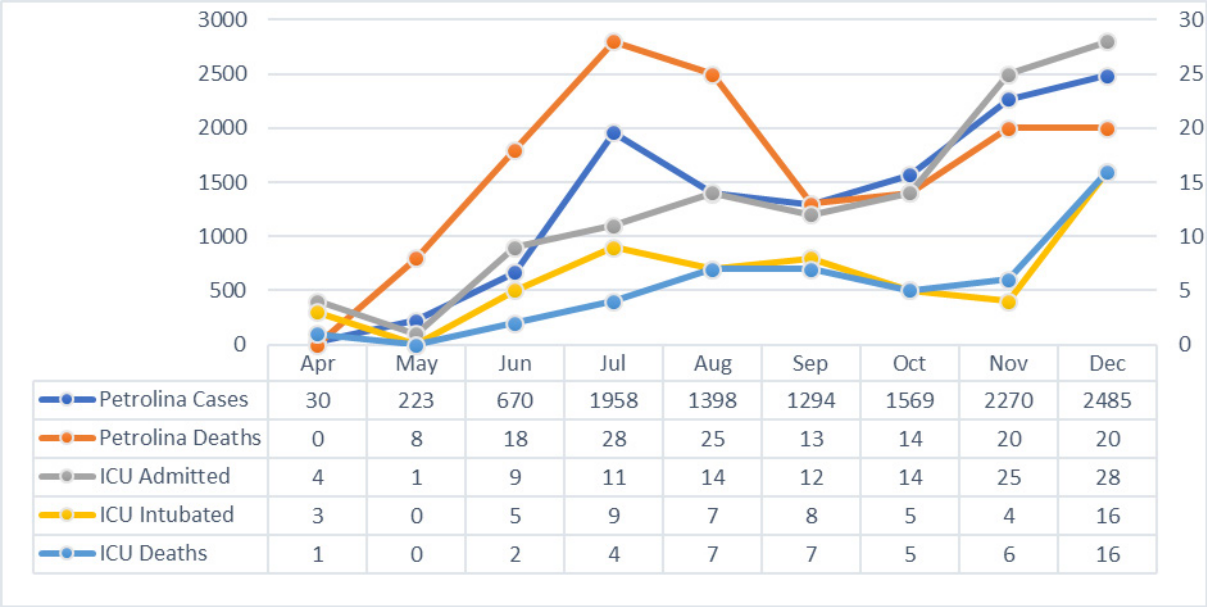
Males showed a pattern of increasing involvement up to the seventh decade of life, according to Graph 2. After the seventh decade of life, there was a decrease in the number of cases. In females, there was an increasing pattern from the sixth decade of life onwards, reaching a peak in the eighth decade. After the eighth decade, the pattern was decreasing.

Graph 2 - Distribution of patients according to sex and age group, Petrolina, 2020



The number of cases and deaths in Petrolina fluctuated during the evaluated period, with ascending intervals between April and July and between September and December, interspersed with a descending period between July and September, as shown in Graph 3. Regarding the monthly evolution in the studied ICU, there was an initial increase between April and July, followed by maintenance of numbers between August and October and subsequent increase between October and December.

Graph 3 - Number of cases and deaths from Covid in the analyzed ICU and in the city



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Petrolina Cases	30	223	670	1958	1398	1294	1569	2270	2485
Petrolina Deaths	0	8	18	28	25	13	14	20	20
ICU Admitted	4	1	9	11	14	12	14	25	28
ICU Intubated	3	0	5	9	7	8	5	4	16
ICU Deaths	1	0	2	4	7	7	5	6	16

The average age of the patients treated was 65.35 years, with the average age of females being higher than the average age of males in relation to the total number of admissions. There was statistical significance of patients' age with sex, intubation and outcome, as can be seen in Table 3.

Table 3 - Difference between mean age of patients, according to variables of interest, Petrolina, 2020

Variable	N	Average	Median	SD	p-value
Gender					p=0.003
F	43	70.5	73.0	15.0	
M	75	62.4	62.0	13.9	
Intubation					p=0.010
Yes	57	68.9	70.0	12.7	
No	61	62.0	62.0	15.9	
Outcome					p<0.001
Discharged	70	59.9	60.0	14.6	
Deaths	48	73.2	73.0	11.0	

p-valor: Student's t test for independent samples; F: Female; M: Male; SD: standard deviation

DISCUSSION

In this study, men (n=75) were more affected than women (n=43). Other studies have also observed this pattern. This involvement profile with higher prevalence in males may be related to the fact that men generally have a lower self-care culture when compared to females[6]. Men tend to seek less medical assistance when compared to women and consequently may have a greater number of comorbidities that were not treated prior to hospitalization because they were unknown due to the lack of clinical follow-up.

Comparing the intubation rate (48.30%) and mortality rate (40.68%) among patients in the ICU of this service with other reported results, we found a similar rate with data from Espírito Santo[7] (39.6%), but including all patients hospitalized in public and private services. Among patients using the ICU at a federal hospital in Rio de Janeiro/RJ, a study showed 47.9% of deaths among all ICU patients and an intubation rate of 61.81%, with 74.2%

of deaths among intubated patients[8]. Another study, carried out at the Hospital Israelita Albert Einstein, in São Paulo - SP, showed the need for intubation in 65% of patients in the ICU[9].

The patients admitted to the studied ICU came from the emergency room or were admitted to the hospital, in addition to those transferred from apartments, wards, or ICUs of other hospitals in the Intermediate Geographic Region of Petrolina and Juazeiro[3]. This service characteristic resulted in a confounding factor in the parameter length of stay of patients in the ICU, generating inconsistent values, which is why this information was disregarded in the study.

The reduced number of cases in the first two months of the study, as shown in Graph 3, is mainly due to the low availability of tests for the diagnosis of COVID-19 in the region at that time, so that the diagnosis was presumed based on clinical and radiological data. From Graph 3, the increase in the number of deaths in the city is observed, reflecting the number of confirmed cases, where the increase in the months of June and July can be associated with the greater flow of people due to the traditional June period, which has a strong regional cultural significance, along with the decrease in temperature that is characteristic of this period of the year. The downward movement in Graph 3 between the months of August and September can be associated with restrictions on the movement and operation of companies, imposed by Municipal Decree[10] for 14 days. Again, the numbers rose again from October onward as a result of the election period. On the other hand, the stability of the number of patients in the service's ICU can be associated with the regulation and transfer from other cities in the region, due to the greater technological apparatus offered in this service, such as renal replacement therapy.

The number of affected patients increased until the seventh decade of life. After the seventh decade, the pattern was decreasing. The profile of involvement on the rise until the seventh decade can be justified because age predisposes to severe forms of the disease and, consequently, a greater number of ICU admissions[11]. After the seventh decade, the decrease in the number of ICU admissions may be associated with the decrease in elderly people exposed to risk due to life expectancy in the country.

Males showed a pattern of increasing involvement up to the seventh decade of life. Age is a risk factor for ICU admission[11]. After the seventh decade, there was a decline in the number of hospitalizations, probably due to the decrease in life expectancy in males after the seventh decade and, consequently, a decrease in exposure. In females, the peak in the number of cases occurred later than in males, occurring in the eighth decade of life. This pattern probably occurred because females have a longer life expectancy and, therefore, greater exposure in more advanced age groups when compared to males.

The data revealed that SUS patients had a greater than 3-fold chance of intubation and 2.75-fold greater chance of dying, compared to patients with health insurance. Factors such as ease of access to the health system and time elapsed to access more complex services, especially among the most vulnerable population, who use the SUS exclusively, are of decisive importance, notably in COVID-19. A study carried out in the state of Espírito Santo showed a greater than 8-fold higher risk of dying for people admitted to the public hospital network compared to those admitted to the private network[12].

Most deaths occurred in males. In this study, men required more ICU admissions than women. In addition, men also required more mechanical ventilation than women. A study on the epidemiological profile of COVID-19 in the states of the Northeast region also observed this pattern of higher mortality in males[13]. A study carried out in the North region of the country also observed higher mortality rates in males[14]. A study that evaluated mortality from COVID-19 nationwide from January 2020 to February 2021 also observed predominantly male mortality when compared to female mortality[15]. Hospitalization in an intensive care unit and the need for orotracheal intubation are risk factors for mortality in COVID-19[8] infection. These factors may have contributed to the higher number of deaths among males. A significant association has also been shown between levels of androgen hormones with susceptibility and severity of COVID-19 in men[16].

CONCLUSION

In this study, men had a higher proportion of hospitalization, intubation, and mortality than women. Mortality was higher among patients requiring mechanical ventilation. Despite sociocultural differences, this pattern is similar to the epidemiological profile observed at the regional level and in other regions of the country. This study may support future studies in the region with a larger sample size.

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