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ANALYSIS OF MORTALITY IN PATIENTS ADVISED FOR COVID-19 IN THE MAIN HOSPITAL OF THE SECOND MACROREGION OF RONDÔNIA

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Abstract: Officially declared a global pandemic on March 11, 2020, COVID-19 is a disease transmitted from person to person and caused by the SARS-COV-2 virus. Popularly known as coronavirus, this disease has the characteristic of presenting a varied clinical spectrum, be it asymptomatic infections or eminently serious conditions. This study is a retrospective descriptive cross-sectional study that aimed, through secondary data collected in the Hospital Infection Control and Competencies sector (CCIH), to identify the rate and profile of mortality caused by this disease at the Cacoal Regional Hospital, the largest hospital in the second macro-region of the state of Rondônia. Analyzing the data obtained from the period from April 2020 to April 2021, it can be determined that the mortality rate in the location was 371.1 per thousand, with the most prevalent individual characteristics in patients being male and older or older. equal to 60 years. Furthermore, it was possible to verify that the majority of deaths occurred in patients with previously diagnosed comorbidities, with the most prevalent conditions, in decreasing order of relevance, being systemic arterial hypertension, diabetes mellitus and cardiomyopathies in general. Finally, it can be seen that the mortality profile of COVID-19 at the Cacoal Regional Hospital is similar to those found in other locations and regions, such as Espírito Santo, Mato Grosso, and even correlates with widely disseminated information by the Brazilian Ministry of Health.

Keywords: COVID-19, Mortality and Intensive Care Center (CTI).

INTRODUCTION

COVID-19 is a disease caused by the SARS-COV-2 virus. Popularly known as coronavirus, it emerged in December 2019; identified in Wuhan, China (WHO, 2020). Transmitted from person to person, it spread globally, causing one of the largest pandemics ever reported in the history of medicine. Officially declared a global pandemic on March 11, 2020 (PAHO, 2020), this condition has the characteristic of presenting a varied clinical spectrum, be it asymptomatic infections or eminently serious conditions. According to the World Health Organization, the majority (around 80%) of patients with COVID-19 may be asymptomatic or oligosymptomatic, and approximately 20% of detected cases require hospital care due to some degree of respiratory failure, of which approximately 5% may require ventilatory support (Ministry of Health, 2020), such as, for example, a nasal catheter with low oxygen flow, HFNC (high flow cannula), NIV and even endotracheal intubation (Barbosa, G, & EL., 2020). Furthermore, those who need outpatient care or in an intensive care center are predominantly elderly and individuals with comorbidities, who are typically more susceptible to severe manifestations of the disease (Moreira, 2020). However, patients who are not part of a characteristic group of previous diseases are not exempt from the need for mechanical ventilation or other types of ventilatory assistance. (PAHO, 2021).

Characteristics in patients with severe disease progression, comorbidities can be numerous and different from each other. Given these circumstances, a survey carried out in Hubei, China, one of the first epicenters of the epidemic, demonstrated that the average age of individuals admitted to the ICU was 66 years old, with a male predominance, and around 58% had chronic conditions, including hypertension., diabetes, kidney

failure and cardiovascular problems (Gao, et al., 2020) (Moreira, 2020); which, to this day, are certainly the most prevalent concomitant diseases in patients admitted to ICUs detected with COVID-19 (Yin, Li, Ying, & Luo, 2021).

Non-specific symptoms such as fever, cough and weakness are common in viral diseases that involve the respiratory system, however, in COVID-19, taste and smell disorders and diarrhea have become major and important markers of infection (Çalıca, et al., 2020). In Brazil, the first case was identified on February 26, 2020 in the State of São Paulo, and the first death on March 17, 2020, in the same state (Painel Coronavirus, 2021). Currently, June 9, 2021, even though there are strong indications of underreporting of their official statistics (The lancet, 2020) (Baud & Qi, 2020), Brazil is the second most affected country, with around 17,122,877 cumulative cases and 479,515 deaths; also having, in the last 24 hours, 85,748 reported cases and 2,723 reported deaths (WHO Coronavirus Dashboard, 2021). Among the total censuses, 235,383 confirmed cases, 6,769 (2.87%) active cases and 5,878 deaths (2.50%) are attributed to Rondônia (AGEVISA RONDÔNIA, 2021).

Based on these aspects, this study seeks to analyze the mortality profile found at the Cacoal Regional Hospital, which is characterized by being the largest hospital in the second macro-region of Rondônia. This article associates the mortality rate with the individual characteristics of each participant (age, sex and comorbidities), with the aim of contrasting and comparing the results obtained with research from other states or regions. Therefore, the question arises whether the mortality profile of COVID-19 at the Cacoal Regional Hospital is similar or different to that found in other locations and whether the characteristics inherent to the patient are the same as those found in other analyzes prior to this one.

METHODOLOGY

The article is a quantitative retrospective cross-sectional observational study that includes all patients admitted to the Cacoal Regional Hospital infected with COVID-19 during the period from April 2020 to April 2021. The research was developed in the Skills and Control sector. Hospital Infection (CCIH) at the Cacoal Regional Hospital, in Cacoal-RO.

The sample analysis was carried out based on secondary data obtained from the notification and monitoring records of suspected cases of COVID-19, which were provided by the General Directorate and the Epidemiology Center of the Cacoal Regional Hospital and compiled in a spreadsheet by the authors of the search on 11/08/2021. The related data and forms are completed by the epidemiology sector and passed on to the Municipal Health Department, and are subsequently consolidated by the Rondônia State Health Department (SESAU-RO). This way, these records make up the national database of Flu Syndrome Notifications, which is made up of information acquired from compulsory notification forms, which present demographic and clinical-epidemiological characteristics of the patients, in addition to the respective case outcomes, whether these are the cure, be the death.

Therefore, through descriptive statistics, the study exposes the participants' mortality profile, associating the mortality rate with the individual and inherent characteristics of each participant, such as age, sex and comorbidities. Seeking to contrast and compare the results, incidence of these factors and mortality in the location, with studies from other states or regions. The results were organized using Microsoft Excel software and are compiled in tables and graphs attached to this article. It is worth noting that the present study has limitations, as the study material

was collected from secondary data, which may contain incomplete or inconclusive information. Furthermore, the methodology used does not allow defining cause and effect relationships, presenting only an association between the information studied.

RESULT

The research was carried out using sample data that includes all patients infected by COVID-19 at the Cacoal Regional Hospital during the period from April 2020 to April 2021. This sample was made up of 1024 patients admitted to the Infirmary or Health Center. Intensive Care at the site, with these individuals being positive for COVID based on clinical criteria or complementary tests, which include serological tests, RT-PCR and antigen research.

With the aim of analyzing the mortality profile of these individuals, the research found that, of the total sample, 380 patients died, which corresponds to a mortality rate of 371.1 per thousand. Among the deaths, 232 (61.05%) were male and 148 (38.95%) were female. In relation to age, an average of 64.5 years can be observed, 257 were 60 years old or over, which corresponds to a percentage of 67.63%; of this group, 109 (28.68%) were between 60 and 70 years old, 95 individuals (25%) were between 70 and 80 years old and 53 (13.95%) were 80 years old or over. The other prevalence values by age can be seen in Graph 1.

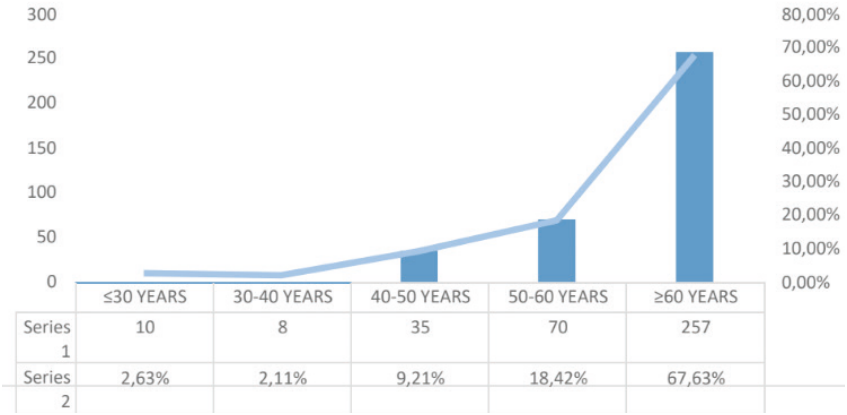
In this study, the main conditions and comorbidities associated with COVID-19 complications at the Cacoal Regional Hospital were also observed. The results were: 77 people (20.26%) did not have any described condition and 303 (79.74%) had some inherent factor or previously present disease, and these were divided into groups to better clarify the data. The groups are separated into elderly, which corresponds to people aged 60 or over; systemic arterial hypertension; diabetes mellitus; heart disease (previous acute myocardial infarction and/or heart failure); chronic kidney disease; obesity; smoking history; pneumopathies (chronic obstructive pulmonary disease and tuberculosis); chronic neurological diseases (stroke and Alzheimer's disease); neoplasms and liver diseases, in addition to these, the division includes a group, called "others", which encompasses a set of factors with a low incidence (≤2 cases) and less relevance to research, such as, for example, pancreatitis, hypothyroidism and immunosuppression for undated cause. Consequently, it was found that the condition most related to mortality was being 60 years old or over with 257 (67.63%) individuals. The two most frequently described comorbidities were hypertension and diabetes mellitus with 95 (25.00%) and 76 (20.00%) cases respectively. The other prevalences can be seen in Table 1.

Characteristics	Number	Percentage
≥60 years	257	67,63%
Hypertension	95	25,00%
Diabetes Mellitus	76	20,00%
Heart diseases	46	12,11%
Chronic kidney disease	27	7,11%
Obesity	23	6,05%
Smoking	22	5,79%
Pneumopathies	19	5,00%
Neuropathies	13	3,42%
Neoplasms	10	2,63%
Liver diseases	4	1,05%
Others	15	3,95%

Table 1 - Analysis of the conditions and comorbidities of patients hospitalized for COVID-19 at the Cacoal Regional Hospital from April 2020 to April 2021.

Source: Prepared by the authors based on HRC data (2020-2021).

Of the deaths, 360 (94.74%) were in the Intensive Care Center (ICU) and 19 (5.00%) in the COVID Ward, in the pediatric sector



Graph 1 – Distribution of mortality by age of patients hospitalized for COVID-19 at the Cacoal Regional Hospital from April 2020 to April 2021.

Source: Prepared by the authors based on HRC data (2020-2021).

the percentage was 0.26%, with one confirmed death. The compulsory notification form presents the date of admission, death, location and daily evolution of these patients. Thus, researching the total days of hospitalization (from admission to death) in the ICU and Infirmary, it was noticed that the majority spent between 5 and 10 days in these sectors 107 (28.16%). The other periods are shown in Table 2.

Days of hospitalization	Number	Percentage
1-5 days	77	20,26%
5-10 days	107	28,16%
10-15 days	81	21,32%
15-20 days	57	15,00%
20-25 days	28	7,37%
25-30 days	11	2,89%
30-35 days	8	2,11%
35-40 days	3	0,79%
≥40 days	8	2,11%
TOTAL	380	100,00%

Table 2 - Analysis of the total days of hospitalization of deaths due to COVID-19 at the Cacoal Regional Hospital from April 2020 to April 2021.

Source: Prepared by the authors based on HRC data (2020-2021).

Furthermore, these data resulted in an average of 11.34 days of hospitalization in the ICU. For the last calculation, patients who did not attend this sector were excluded, 3.68% of individuals, who necessarily had this characteristic: dying without admission or transfer to the ICU, remaining hospitalized only in the COVID Ward or pediatric sector from hospital. In this sector, the majority (194; 51.05%) remained hospitalized for less than 10 days and only 6 (1.58%) patients stayed the maximum time studied, which was greater than or equal to 40 days in the ICU. Details of the days spent in the ICU are shown in Table 3.

CTI days	**Number**	**Percentage**
< 10 days	194	51,05%
10-20 days	119	31,32%
20-30 days	36	9,47%
30-40 days	11	2,89%
≥40 days	6	1,58%
No day	14	3,68%
TOTAL	380	100,00%

Table 3 – Analysis of days spent in the ICU of deaths due to COVID-19 at the Cacoal Regional Hospital from April 2020 to April 2021.

Source: Prepared by the authors based on HRC data (2020-2021).

Likewise, within the scope of the Infirmary, some patients were admitted or transferred to this location during their hospitalization. Therefore, the average stay is 4 days; This information was calculated only from patients who attended the ward, which were 87 (22.83%). It is noteworthy that 293 (77.11%) were only in the ICU, that is, with admission and death in the same place. Most of those who passed through the COVID Infirmary stayed for one or two days, totaling 42 (11.05%). The days in the COVID Ward by period are shown in Table 4.

Infirmary Days	Number	Percentage
Nenhum	293	77,11%
1-3 days	42	11,05%
3-6 days	26	6,84%
6-10 days	9	2,37%
10-20 days	9	2,37%
≥20 days	1	0,26%
TOTAL	381	100,00%

Table 4 - Analysis of Infirmary days of deaths due to COVID-19 at the Cacoal Regional Hospital from April 2020 to April 2021.

Source: Prepared by the authors based on HRC data (2020-2021).

DISCUSSION

The results of the present study indicate that, in the main hospital in the second macro-region of Rondônia, there was a greater number of deaths, due to the new coronavirus, among male individuals during the period from April 2020 to April 2021. Also, there was a higher prevalence of deaths in people who are characterized as: age group

With 60 years or older and/or who have previous associated comorbidities, mainly Systemic Arterial Hypertension and Diabetes Mellitus. Finally, the rate of deaths in the ICU was higher than that of deaths in the ward when compared, and the length of stay in the ICU was shorter in the majority of patients who died.

The current research showed that 61.05% of patients were male and 38.95% were female. Comparing this with studies carried out in other regions, it is observed that in the states of Espírito Santo and Mato Grosso, the majority of deaths also occurred in males, with the percentages in these states being 57.1% and 61%, respectively. (Maciel, et al., 2020) (Caló, et al., 2020); proving that these data are a national reality, a survey carried out across the country demonstrated that the mortality rate is also higher in this sex (Porto, et al.). This data can be explained by the presence of estrogen in women, this hormone can stimulate immunity by eliminating viral infections, contributing to a better immune response to the coronavirus (Imanpour, Rezaee, & Nouri-Vaskeh, 2020). Another factor that has an impact on the mortality rate of men in COVID-19 is the existence of previous diagnosed and undiagnosed illnesses, such as diabetes and hypertension, or even heart disease, which are, in fact, more common in men (Schmidt, et al., 2006). Furthermore, it is worth highlighting that according to a study carried out in Brazil on morbidity and mortality among men, they seek less health care than women, consequently, the care for acquired diseases is not adequate or satisfactory, corroborating the exacerbation of these diseases in conditions more serious, which are common with the new coronavirus. Furthermore, it has been proven that females complain much more than men when receiving medical care, which could be a positive characteristic for further elucidation of symptoms and subsequent diagnosis of the disease. (Laurenti, Jorge, & Gotlieb).

According to the Ministry of Health, some of the conditions and risk factors to be considered for possible complications from COVID-19 are age equal to or greater than 60 years, smoking, obesity, cardiomyopathies

of different etiologies, high blood pressure and cerebrovascular disease. (Federal Government, 2021).

Highlighting the fact that the high age group is one of the risk factors stated by the Ministry of Health, it is reported that, in this survey, 67.63% of deaths were in patients over 60 years of age, agreeing with the aforementioned data and also with a study estimating risk factors for mortality from COVID-19 carried out in 2020 in China, in which age is the condition that presents itself as biggest risk factor. In the present study, the number of people aged 60-70 who died is represented by 28.68%, 25% were aged 70-80 and 13.95% were 80 years or more. This way, it is analyzed that as the data reaches the seventh decade of life there is a decrease in the number of patient deaths, which can be explained by two hypotheses: the first is the characteristic of the life expectancy of Brazilians, which, in according to IBGE, it is 76.6 years old, therefore, this State has a final apex at the top of its age pyramid, which is made up of elderly people over 75 years old, who are in smaller numbers in the current population of Brazil, having, consequently a lower death rate. (IBGE, Social Statistics, 2020) (IBGE, Brazilian population projection, 2021). Thinking about actions proposed during the pandemic period, as a second hypothesis it can be mentioned that this fact is also due to greater protection and care for the elderly over 70 years old, these being, at the behest of their closest family members, more isolated in their homes or isolated from the rest of their younger relatives, who in theory would be susceptible to contagion due to greater social contact.

The comorbidities found in this study were Systemic Arterial Hypertension, Diabetes Mellitus, heart disease, chronic kidney disease, obesity, smoking, lung diseases, chronic neurological diseases, neoplasms, chronic liver diseases, hypothyroidism, Down syndrome, leprosy and immunosuppression without a detailed cause. Systemic Arterial Hypertension being equivalent to 25% of patients and Diabetes Mellitus 20%, characterizing them as more prevalent. In a study carried out in Santa Catarina, chronic cardiovascular diseases and diabetes were highlighted with a high percentage related to other comorbidities (Ramos & Menegon, 2020). In the studies mentioned above in Espírito Santo, the situation is similar to that of other states with cardiovascular diseases and diabetes with a higher percentage associated with death from COVID-19 (Maciel, et al., 2020). In the Mato Grosso study, there is a prevalence of Systemic Arterial Hypertension and Diabetes Mellitus (Caló, et al., 2020).

Furthermore, in the study carried out in Espírito Santo, conditions such as lung, kidney, immunological diseases, HIV and hepatitis were also associated with higher mortality rates (Maciel, et al., 2020). The prevalent comorbidities are similar in the articles cited. There are two hypotheses for this: It was found in the study carried out in China that individuals whose troponin T levels increased during COVID-19, which indicates the occurrence of acute myocardial injury, presented greater lethality. Those with Chronic cardiovascular diseases were more common to have increased troponin T than those who did not have comorbidities such as chronic cardiovascular diseases and associated Diabetes, that is, more acute myocardial injury occurred in these individuals, causing exacerbation of the condition. However, not only individuals with chronic cardiovascular diseases had elevated levels of troponin T, but also those with other conditions such as chronic kidney disease and chronic lung disease (Tao Guo, et al., 2020). Another hypothesis is the functional limitation of the vascular endothelium, which is found in cardiovascular diseases, individuals with

insulin resistance, diabetes mellitus and obesity. The inflammatory process is related to this endothelial dysfunction, which is characterized by increased oxidative stress, hemodynamic dysregulation and increased expression of inflammatory molecules. This inflammatory process can harm the repair mechanisms that are included in our body's defense, which when it is attacked, such as by the Sars-Cov-2 virus, this dysregulation and inflammation increase in cases of the most prevalent comorbidities in studies (Andrade, Santos, & Vilela-Martin, 2014).

The intensive care center is the hospital location with the highest complexity of care, with a multidisciplinary and interdisciplinary team specialized in critically ill patients, where constant monitoring of vital signs, ventilatory support and the use of complex medications can be offered.

According to Portal Hospitais Brasil, the profile of a patient admitted to the ICU showed a patient with a median age of 64 years, 60.5% are men, highlighting the importance of risk factors, given that around 33.6% have diabetes, 56.4% are hypertensive, 5.9% smokers and 15.5% have some cardiovascular disease. Furthermore, 56% of them required mechanical ventilation with a median time of using the device of 11 days, reinforcing the need for intensive care (``Portal Hospitais Brasil``, 2021). In the main hospital in the second macro-region of Rondônia, the research study site, data were obtained that 94.74% of deaths occurred in the ICU and only 5% in the ward. No relevant articles were found for comparison. Furthermore, the length of stay in the ICU of these patients resulted in 51.05% remaining less than 10 days and 1.58% 40 days or more. Furthermore, 3.68% died without transfer to the ICU, remaining in the ward. Between the ICU and the Infirmary, 20.26% of deaths remained hospitalized for up to 5 days, this can be explained by the worsening of patients in less complex units and getting places at the reference center after an exacerbated inflammatory process has already occurred and late arrival in these centers.

It is necessary to highlight that the present study has limitations, as the data were collected from secondary data, which may contain reporting errors or incomplete information. It is also noteworthy that the study proposes to present the profile of deaths due to COVID-19 in the main hospital in the second macro-region of Rondônia in the proposed period, and not to present solutions for such results. Furthermore, the methodology used does not allow defining cause and effect relationships, presenting only an association between the information studied.

CONCLUSION

In summary, according to the detailed analysis of the mortality profile due to Covid-19 at the Hospital Regional de Cacoal from April 2020 to April 2021, it is concluded that the mortality rate there is 371.1 per thousand, with individual characteristics most prevalent in patients: male gender and age greater than or equal to 60 years. Furthermore, it was possible to verify that the majority of deaths occurred in patients with previously described comorbidities, with the most prevalent conditions, in decreasing order of relevance, being systemic arterial hypertension, diabetes mellitus and heart disease in general.

This way, it can be stated that the mortality profile of COVID-19 at the Cacoal Regional Hospital is similar to those found in other locations and regions, such as Espírito Santo, Mato Grosso, and even correlates with the information widely disseminated by the Brazilian Ministry of Health. As additional information, we note that, when compared, the number of deaths in the ICU was higher

than the number of deaths in the ward, with 94.74% of deaths occurring in the Intensive Care Center and 5% in the COVID-19 ward.

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