**Hospitalizations due to Covid-19 in a public hospital of Sistema Único de Saúde (SUS), Brazil**

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**ABSTRACT**

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| **Background:** Covid-19 began in Wuhan, China, at the end of 2019 and was declared a pandemic on March 11, 2020. The risk groups related to a serious outcome are: age >75 years, men, severe obesity, hypertension, diabetes and cardiovascular and respiratory diseases. **Objective:** This study aims to identify the profile of patients with Covid-19 and their clinical outcome in a hospital of the Unified Health System, in the first two years of the pandemic. **Methods:** This is a retrospective, descriptive study with a quantitative approach. The sample consisted of 285 medical records. **Results:** There was a predominance of white males with primary and secondary education. Comorbidities increased in the second year, with hypertension and type II diabetes mellitus standing out. The nurse's station was predominant in year 1 and the intensive care unit in year 2. The spectacle-type nasal cannula was widely used in both years, while orotracheal intubation prevailed in the second year. As for the outcome, discharge or death, there were variations in terms of age, place and time of hospitalization, method of ventilatory support and pulmonary impairment between the two groups. **Conclusions**: The study contributes to a better understanding of the factors involved and the outcomes of Covid-19 hospitalizations and shows the epidemiological- demographic parameters and clinical parameters of the patient in this locality. |

*Keywords: Covid-19 Pandemic, Epidemiology; Respiratory Tract Diseases,* *cardiovascular*

**1. INTRODUCTION**

According to the World Health Organization (Organização Pan-Americana de Saúde, 2020), the Covid-19 epidemic began in the city of Wuhan, China, at the end of 2019 and quickly spread worldwide, being declared a pandemic on March 11, 2020. Men had a higher risk of infection compared to women and of developing the severe form of SARS-CoV-2 infection, requiring hospitalization in an intensive care unit and resulting in more often death (Pijls et al., 2021).

Patients with SARS-CoV-2 infection had a wide range of symptoms, with mild to moderate cases usually characterized by fever, cough, odynophagia, malaise, headache, dyspnea and tachypnea. Severe cases can present with pneumonia, acute respiratory symptoms and septic shock (Mahalmani et al., 2020). Patients with milder symptoms (80%) tend to improve after a week. On the other hand, patients with severe infection (14%) had a high risk of progression to acute lower respiratory infection leading to respiratory failure and/or organ dysfunction syndrome and death (5%) (Ghaebi et al., 2021). Thus, approximately 20 to 30% of hospitalized patients may required intensive care unit support and, in the presence of complications, oxygen therapy, mechanical ventilation and extracorporeal membrane oxygenation are necessary (Ghaebi et al., 2021; Yazdanpanah et al., 2021).

The main modes of transmission of SARS-CoV-2 infection are respiratory droplets and close contact with an infected individual and the average incubation period of confirmed patients is 5 (2-14) days (Zhao et al., 2023). The majority of SARS-CoV-2 infection positive cases affected the 25-60 age groups, with the average age being 47 (Khan et al., 2020). Ethnic and racial disparities have been reported, with African American/Black populations experiencing disproportionately higher rates of SARS-CoV-2 infection and higher mortality (Mackey et al., 2021).

The prevalence of multiple comorbidities in individuals hospitalized with SARS-CoV-2 infection was been widely described (Souza Filho et al., 2021). Older age, in addition to being a risk factor for mortality, seems to be associated with longer hospital stays and a high viral load. In addition, obesity, diabetes mellitus, hypertension, cardiovascular disease, chronic kidney disease, chronic lung disease, cancer, immunosuppression and smoking are among the most common risk factors for severe cases of the disease (Ejaz et al., 2020).

The outcome of the disease depends on its presentation and severity, varying according to the patient's medical history, age and gender. Thus, the risk groups related to a serious outcome for Covid-19 included characteristics such as: age >75 years, men compared to women, severe obesity, hypertension, diabetes, cardiovascular and respiratory disease (Booth et al., 2021; Cheng et al., 2021). Sousa et al. (2022) reported high lethality in hospital records, especially in the interior regions, with a higher percentage of elderly people, men, black skin color and the presence of one or two comorbidities (Sousa et al., 2022). Significant reductions in the number of hospitalizations, case-fatality rates and severe cases of the disease were seen from the second year of the pandemic, when the population immunization began. In Brazil, the vaccination campaign began on January 18, 2021 and initially focused on the elderly and health workers (Boing et al., 2023).

Three years on from the first case of SARS-CoV-2 infection recorded in the country, in March 2023 there were about 700,000 deaths from the disease in Brazil. In the work against this crisis, science proves that the main form of protection against serious cases and deaths is the immunization (Brasil, 2023). Given the impact of the Covid-19 pandemic and the need for studies reporting on the disease reality in Brazilian philanthropic hospitals, this study was carried out. In this context, the aim of the study was to identify the sociodemographic and clinical profile of patients and the outcome of Covid-19 cases in a public hospital that provides care in the first two years of the pandemic.

**2. material and methods**

This is a retrospective, descriptive study with a quantitative approach. Descriptive research aims to observe record and describe the characteristics of a particular phenomenon that has occurred in a population. The quantitative approach focuses on working with variables expressed in the form of numerical data, using statistical resources and techniques to classify and analyze (Fontelles et al., 2009).

The study was based on consulting the medical records of patients hospitalized for Covid-19 in a Brazilian philanthropic hospital. The study was carried out at the São Paulo Regional Hospital, located in the municipality of Xanxerê, SC, accredited in High Complexity Cardiology services, a reference for more than 1.3 million people from a total of 110 municipalities (Hospital Regional São Paulo, 2022).

The sample consisted of medical records of patients hospitalized since the pandemic was declared, March 11, 2020, until March 11, 2022. The sample was probabilistic, with two subgroups, one from the first year (March 11, 2020 to March 11, 2021, with 143 medical records), and the other from the second year (March 12, 2021 to March 11, 2022, with 142 medical records), during which vaccination was already underway.

The sample was based on the total number of records of patients admitted to the hospital for Covid-19 (a total of 1120 records). A list of medical records for each year was obtained and a random design was made to compose the sample. The EpiInfo software (version 2021 7.2.5) was used for this, adopting a 95% confidence level and a error of 5%. A total sample size of 285 medical records was obtained, which were divided into two clusters (year 1 and year 2). After defining the sample size, the Excel software function "Random()" was used to sort the medical records, which were organized sequentially by date and time of admission in the hospital. Any medical records sorted for patients less than 18 years old were excluded from the sample.

The data from the patients' medical records was transcribed into an Excel spreadsheet. The data was collected on the premises of the hospital itself, with the agreement of the institution involved. No medical records in physical or digital form were removed from the hospital.

To determine the sociodemographic and clinical profile, the following variables were explored: patient profile (age, gender, marital status, schooling, race and religion), morbidities, length of hospitalization, need for ventilatory support, ventilatory modality, length of ventilatory support, procedures (tracheostomy, chest drainage and dialysis), use of antibiotics, anticoagulants and blood components, complications, imaging tests performed, Covid-19 vaccination, need for enteral or parenteral diet and outcome (cured discharge, death or transfer).

The data was analyzed in terms of frequency, mean, median, percentiles, and dispersion. Frequency tables were used to represent these descriptive statistics. Inferential statistics were used to explore possible differences in Covid-19 outcomes between the two sampling periods. The Shapiro-Wilk test was used to test the distribution of the data. Non-parametric Mann-Whitney and Kruskal-Wallis tests were used to test differences between group and subgroup variables. In addition, the Chi-squared association test was used to assess possible relationships between groups and/or subgroups formed from the sample. The Excel for Windows (Microsoft Excel 2016), Past (Hammer et al., 2001) and SPSS (version 28.0.1) software were used for the analyses. The p-value < 0.05 was adopted as statistical significance level.

The research was carried out in accordance with CNS Resolution 466/2012 (Brasil, 2012) and Resolution 510/2016 (Brasil, 2016) and approved under Opinion: 5.543.130. It was also carried out in accordance with the General Personal Data Protection Law (LGPD), Law No. 13,709/2018 (Brasil, 2018).

**3. results**

A total of 285 medical records were consulted. There was a predominance of male patients in the sample, 60.1% in year 1 and 53.5% in year 2 (p = 0.157). The majority did not have a partner in both year 1 (51.0%) and year 2 (52.8%) (p = 0.429). Most patients had complete or incomplete primary education in both years (p = 0.289). In relation to race, there was a significant difference (p <0.05) between the patients in both years, with the white colored predominating, but with an increase in the prevalence of brown colored in year 2 (17.6%). Catholics predominated in both years (p = 0.622) (Table I).

Regarding the comorbidities reported in the medical records, almost half of the patients admitted were hypertensive (42.0% in year 1 and 50.0% in year 2), 22% were overweight or obese and 14% were smokers in the two years. Diabetes mellitus was reported in 18.2% of medical records in year 1 and 26.1% in year 2. Dyslipidemic patients accounted for less than 10% in both periods and those with heart disease or a history of previous ischemic events, less than 15%. In addition, in 35% of cases other morbidities were reported, both in year 1 and year 2 (Table I).

**Table I. Sociodemographic and clinical profile of patients admitted with Covid-19 to a Brazilian public hospital in the first two years of the pandemic: March 11, 2020 to March 11, 2021 and March 12, 2021 to March 11, 2022. n = number of medical records consulted; X2= Chi-square test.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Year 1** | | **Year 2** | |  |
| **Variable** | **n** | **%** | **n** | **%** | **Significance** |
| **Sex** |  |  |  |  |  |
| Female | 57 | 39.9 | 66 | 46.5 | X2= 1.272;  p= 0.157 |
| Male | 86 | 60.1 | 76 | 53.5 |
| **With a partner** |  |  |  |  |  |
| Yes | 70 | 49.0 | 67 | 47.2 | X2= 0.089;  p= 0.429 |
| No | 73 | 51.0 | 75 | 52.8 |
| **Education** |  |  |  |  |  |
| Elementary School | 69 | 48.3 | 70 | 49.3 | X2= 4.898;  p= 0.298 |
| High School | 31 | 21.7 | 25 | 17.6 |
| Graduate | 14 | 9.8 | 7 | 4.9 |
| Not literate | 7 | 4.9 | 8 | 5.6 |
| Not informed | 22 | 15.4 | 32 | 22.5 |
| **Race** |  |  |  |  |  |
| White | 119 | 83.2 | 110 | 77.5 | X2= 9.538;  p= 0.049\* |
| Yellow | 5 | 3.5 | 1 | 7.0 |
| Indigenous | 7 | 4.9 | 6 | 4.2 |
| Black | 1 | 7.0 | 0 | 0.0 |
| Brown | 11 | 7.7 | 25 | 17.6 |
| **Religion** |  |  |  |  |  |
| Catholic | 84 | 58.7 | 77 | 54.2 | X2= 2.625; p=0.622 |
| Evangélica | 34 | 23.8 | 31 | 21.8 |
| Outras | 1 | 7.0 | 1 | 7.0 |
| Sem religião | 2 | 1.4 | 1 | 7.0 |
| Não informado | 22 | 15.4 | 32 | 22.5 |
| **Dyslipidemia** |  |  |  |  |  |
| Yes | 12 | 8.4 | 13 | 9.2 | X2= 0.052;  p= 0.493 |
| No | 131 | 91.6 | 129 | 90.8 |
| **Systemic Arterial Hypertension** |  |  |  |  |  |
| Yes | 60 | 42.0 | 71 | 50.0 | X2=1.855;  p= 0.107 |
| No | 83 | 58.0 | 71 | 50.0 |
| **Diabetes Mellitus** |  |  |  |  |  |
| Yes | 26 | 18.2 | 37 | 26.1 | X2= 2.566;  p= 0.072 |
| No | 117 | 81.8 | 105 | 73.9 |
| **Obesity/overweight** |  |  |  |  |  |
| Yes | 32 | 22.4 | 32 | 22.5 | X2= 0.001;  p= 0.544 |
| No | 111 | 77.6 | 110 | 77.5 |
| **Smoker/ex-smoker** |  |  |  |  |  |
| Yes | 21 | 14.7 | 21 | 14.8 | X2= 0.001;  p= 0.577 |
| No | 122 | 85.3 | 121 | 85.2 |
| **Heart disease/previous ischemic event** |  |  |  |  |  |
| Yes | 13 | 9.1 | 19 | 13.4 | X2= 1.315;  p= 0.169 |
| No | 130 | 90.9 | 123 | 86.6 |
| **Other morbidity** |  |  |  |  |  |
| Yes | 53 | 37.1 | 52 | 36.6 | X2= 0.006;  p= 0.518 |
| No | 90 | 62.9 | 90 | 63.4 |

Source: The authors (2023).

The nursing predominated as the place of hospitalization in year 1 and the intensive care unit in year 2 (p = 0.339). The ventilation modality, the spectacle-type nasal cannula was used in both periods (76.2% in year 1 and 73.2% in year 2) (p = 0.562). Non-invasive ventilation was used in 32.9% in year 1 and 54.9% in year 2 (p < 0.05). Invasive mechanical ventilation modalities were used in both years. In total, 29.4% of patients underwent orotracheal intubation in year 1 and 33.8% in year 2, while tracheostomy was used in 8.4% of patients in year 1 and 10.6% in year 2 (p = 0.531) (Table II).

Smaller percentages of patients required procedures during hospitalization, the main ones being: chest tubes (7.0% in year 1 and 3.5% in year 2) (p = 0.189) and hemodialysis (7.7% in year 1 and 6.3% in year 2) (p = 0.655). As for the medication, antibiotics were widely used in both study periods (p = 0.318), as were anticoagulants (p = 0.996). Blood components were used in the minority of cases (21.7% in year 1 and 17.6% in year 2) (p = 0.387). Complications, such as hemodynamic shock and acid-base disorders, were present in both periods (57.3% in year 1 and 56.6% in year 2) (p = 0.864) (Table II).

With regard to imaging tests, isolated computed tomography scans were performed in 49.7% of patients in year 1 and 42.2% in year 2, unlike X-rays, which were prescribed in isolation for only a few patients (year 1 = 6.3% and year 2 = 7.0%). X-rays and computed tomography scans together in the same patient were prescribed for 42.7% in period 1 and 45.8% in period 2 (Table II).

Among those hospitalized with Covid-19 who underwent computed tomography scans, the results revealed the rate of pulmonary impairment, with the majority of patients (34.3%) having 50 to 75% pulmonary impairment in year 1. In year 2, the majority (40.1%) had 25 to 50% lung involvement (p < 0.05) (Table II).

About the Covid-19 vaccine, no patient was immunized during year 1, as it was not yet available. In year 2, however, 28.2% of the medical records reported at least one dose (p <0.05). With regard to the type of diet offered to patients in the two periods, the oral route prevailed (p = 0.161). As for the outcome, there were higher rates of discharge in both years (year 1 = 61.5% and year 2 = 61.3%), followed by death (year 1 = 31.5% and year 2 = 30.3%) and with less prevalence of transfer/evasion (p = 0.892) (Table II).

**Table II. Profile of Covid-19 hospitalizations in a Brazilian public hospital. Year 1 (March 11, 2020 to March 11, 2021) and year 2 (March 12, 2021 to March 11, 2022). n = number of medical records consulted; X2 = Chi-squared test.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Year 1** | | **Year 2** | |  |
| **Variable** | **n** | **%** | **n** | **%** | **Significance** |
| **Place of hospitalization** |  |  |  |  |  |
| Nursing | 74 | 51.7 | 69 | 48.6 | X2= 0.284;  p= 0.339 |
| Intensive care unit | 69 | 48.3 | 73 | 51.4 |
| **Nasal cannula** |  |  |  |  |  |
| Yes | 109 | 76.2 | 104 | 73.2 | X2= 0.336;  p= 2.562 |
| No | 34 | 23.8 | 38 | 26.8 |
| **Non-invasive ventilation** |  |  |  |  |  |
| Yes | 47 | 32.9 | 78 | 54.9 | X2= 14.085;  p= 0.000\* |
| No | 96 | 67.1 | 64 | 45.1 |
| **Orotracheal intubation** |  |  |  |  |  |
| Yes | 42 | 29.4 | 48 | 33.8 | X2= 0.648;  p= 0.421 |
| No | 101 | 70.6 | 94 | 66.2 |
| **Tracheostomy** |  |  |  |  |  |
| Yes | 12 | 8.4 | 15 | 10.6 | X2= 0.392;  p= 0.531 |
| No | 131 | 91.6 | 127 | 89.4 |
| **Chest drain** |  |  |  |  |  |
| Yes | 10 | 7.0 | 5 | 3.5 | X2= 1.722;  p= 0.189 |
| No | 133 | 93.0 | 137 | 96.5 |
| **Hemodialysis** |  |  |  |  |  |
| Yes | 11 | 7.7 | 9 | 6.3 | X2= 0.200;  p= 0.655 |
| No | 132 | 92.3 | 133 | 93.7 |
| **Other procedures** |  |  |  |  |  |
| Yes | 7 | 4.9 | 3 | 2.1 | X2= 1.629;  p= 0.202 |
| No | 136 | 95.1 | 139 | 97.9 |
| **Antibiotics** |  |  |  |  |  |
| Yes | 142 | 99.3 | 142 | 100.0 | X2= 0.997;  p = 0.318 |
| No | 1 | 0.7 | 0 | 0.0 |
| **Anticoagulant** |  |  |  |  |
| Yes | 142 | 99.3 | 141 | 99.3 | X2= 0.000;  p = 0.996 |
| No | 1 | 0.7 | 1 | 0.7 |
| **Blood component** |  |  |  |  |  |
| Yes | 31 | 21.7 | 25 | 17.6 | X2= 0.749;  p= 0.387 |
| No | 112 | 78.3 | 117 | 82.4 |
| **Complications** |  |  |  |  |  |
| Yes | 82 | 57.3 | 80 | 56.3 | X2= 0.029;  p= 0.864 |
| No | 61 | 42.7 | 62 | 43.7 |
| **Imaging exam** |  |  |  |  |  |
| Computed tomography | 71 | 49.7 | 67 | 47.2 | X2= 2.292;  p= 0.514 |
| X-ray | 9 | 6.3 | 10 | 7.0 |
| Computed tomography and X-ray | 61 | 42.7 | 65 | 45.8 |
| None | 2 | 1.4 | 0 | 0.0 |
| **Lung involvement in chest computed tomography** |  |  |  |  |  |
| <25% | 11 | 7.7 | 9 | 6.3 | X2= 12.040;  p= 0.034\* |
| 25-50% | 36 | 25.2 | 57 | 40.1 |
| 50-75% | 49 | 34.3 | 48 | 33.8 |
| >75% | 4 | 2.8 | 4 | 2.8 |
| Not realized | 11 | 7.7 | 10 | 7.0 |
| Not informed | 32 | 22.4 | 14 | 9.9 |
| **Covid-19 vaccine** |  |  |  |  |  |
| Yes | 0 | 0.0 | 40 | 28.2 | X2= 261.966;  p= 0.000\* |
| Not performed | 143 | 100.0 | 6 | 4.2 |
| Not informed | 0 | 0.0 | 96 | 67.6 |
| **Type of diet** |  |  |  |  |  |
| Oral | 97 | 67.8 | 85 | 59.9 | X2= 1.962;  p= 0.161 |
| Enteral | 46 | 32.2 | 57 | 40.1 |
| **Outcome** |  |  |  |  |  |
| Discharge | 88 | 61.5 | 87 | 61.3 | X2= 0.229;  p= 0.892 |
| Death | 45 | 31.5 | 43 | 30.3 |
| Transfer/Evasion | 10 | 7.0 | 12 | 8.5 |

Source: The authors (2023).

There was no significant difference (U = 37.5; p > 0.05) between the complications: hemodynamic shock (6.1%, 5.4%); acidobasic disorders (6.7%, 10.2%); hydroelectrolytic disorders (18.4%, 26.3%); hypotension (7.4%, 10.2%); acute or chronic acute renal failure (8.0%, 7.2%); pneumonia (11.0%, 5.4%); severe acute respiratory distress syndrome (3.1%, 3.6%); septic shock (7.4%, 6.6%); and other complications (31.9%, 25.1), for year 1 and 2, respectively.

However, there was a significant association between age and the periods analyzed (p < 0.05), with the average in year 1 being higher than in year 2 (59.8 and 56.6, respectively). Length of stay also showed a significant association (p < 0.05), with an average of 9.5 days in year 1 and 11.8 in year 2, with the maximum number of days hospitalized decreasing from 76 to 58 from the first to the second period. As for saturation, the average (91%) remained the same in both years, with no significant association (p = 0.641). Similarly, orotracheal intubation time averaged 2.4 days in year 1 and 4.3 in year 2 (p = 0.081) (Table III).

**Table III. Clinical profile and care provided to patients admitted with Covid-19 to a Brazilian public hospital in year 1 (March 11, 2020 to March 11, 2021) and year 2 (March 12, 2021 to March 11, 2022). U = Mann-Whitney test.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Year** | **Average (SD)** | **Minimum value** | **Maximum value** | **Significance** |
| Age (years) | 1 | 59.8 (16.7) | 19.0 | 92.0 | U= 8775.0; p= 0.048\* |
| 2 | 56.6 (15.6) | 27.0 | 88.0 |
| Length of stay (days) | 1 | 9.5 (10.1) | 0.0 | 76.0 | U= 8479.5; p= 0.016\* |
| 2 | 11.8 (10.9) | 1.0 | 58.0 |
| Saturation (%) | 1 | 91.7 (5.9) | 65.0 | 100.0 | U= 9690.5; p= 0.641 |
| 2 | 91.0 (7.3) | 40.0 | 100.0 |
| Time of orotracheal intubation (days) | 1 | 2.4 (5.2) | 0.0 | 34.0 | U= 9141.5; p= 0.081 |
| 2 | 4.3 (7.4) | 0.0 | 38.0 |

Source: The authors (2023).

As for the outcome, the majority of patients who died were in the intensive care unit (24.6%) and did not have a partner (19.3%). Only 1.1% of patients had dyslipidemia and 6% diabetes mellitus. With regard to ventilation modality, the greatest use was of invasive mechanical ventilation by orotracheal intubation (21.4%), followed by non-invasive ventilation (18.2%) and nasal cannula glasses (15.8%), which also resulted in a predominance of enteral diet use (24.9%). The use of blood components and procedures such as chest tubes, hemodialysis or others were not necessary in the majority of cases. A total of 26.7% of the patients had some complication, such as hydroelectrolytic disorders, pneumonia and septic shock. The highest percentage of patients underwent X-rays and computed tomography as an imaging test (20.0%), with lung involvement of between 50 and 75% being the most common (Table IV).

The patients who were discharged were mostly in the nursing (40.4%) and had a partner (33.0%). A total of 6.3% of patients were diagnosed with dyslipidemia and 12.6% with diabetes mellitus. Nasal cannula use predominated (54.4%), followed by non-invasive ventilation (21.4%) and orotracheal intubation (6.3%). The oral diet was the most commonly used (54.0%). The use of blood components and procedures such as chest tubes, hemodialysis or others were not performed in the majority of patients. There were no complications in 35.8% of cases. Computed tomography alone was the most commonly performed imaging test, showing pulmonary involvement of 25 to 50% in most reports (Table IV).

**Table IV. Outcome of patients hospitalized with Covid-19 in a Brazilian public hospital associated with sociodemographic and clinical profile, from 2020 to 2022. n = number of medical records consulted; X2 = Chi-squared test.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Discharge** | | **Death** | | **Transfer**  **/ Evasion** | | **Significance** |
| **Variable** | **n** | **%** | **n** | **%** | **n** | **%** |  |
| **Place of hospitalization** |  |  |  |  |  |  |  |
| Ward | 115 | 40.4 | 18 | 6.3 | 10 | 3.5 | X2=48.192; p=0.000\* |
| Intensive care unit | 60 | 21.1 | 70 | 24.6 | 12 | 4.2 |
| **With partner** |  |  |  |  |  |  |  |
| Yes | 94 | 33.0 | 33 | 11.6 | 10 | 3.5 | X2= 6.232; p=0.044\* |
| No | 81 | 28.4 | 55 | 19.3 | 12 | 4.2 |
| **Dyslipidemia** |  |  |  |  |  |  |  |
| Yes | 18 | 6.3 | 3 | 1.1 | 4 | 1.4 | X2=6.098; p=0.047\* |
| No | 157 | 55.1 | 85 | 29.8 | 18 | 6.3 |
| **Diabetes mellitus** |  |  |  |  |  |  |  |
| Yes | 36 | 12.6 | 17 | 6.0 | 10 | 3.5 | X2= 7.602; p=0.022\* |
| No | 139 | 48.8 | 71 | 24.9 | 12 | 4.2 |
| **Nasal cannula** |  |  |  |  |  |  |  |
| Yes | 155 | 54.4 | 45 | 15.8 | 13 | 4.6 | X2= 46.552; p=0.000\* |
| No | 20 | 7.0 | 43 | 15.1 | 9 | 3.2 |
| **Non-invasive ventilation** |  |  |  |  |  |  |  |
| Yes | 61 | 21.4 | 52 | 18.2 | 12 | 4.2 | X2= 15.071; p=0.001\* |
| No | 114 | 40.0 | 36 | 12.6 | 10 | 3.5 |
| **Orotracheal intubation** |  |  |  |  |  |  |  |
| Yes | 18 | 6.3 | 62 | 21.8 | 10 | 3.5 | X2= 100.236; p=0.000\* |
| No | 157 | 55.1 | 26 | 9.1 | 12 | 4.2 |
| **Chest drain** |  |  |  |  |  |  |  |
| Yes | 1 | 0.4 | 12 | 4.2 | 2 | 0.7 | X2= 20.746; p=0.000\* |
| No | 174 | 61.1 | 76 | 26.7 | 20 | 7.0 |
| **Hemodialysis** |  |  |  |  |  |  |  |
| Yes | 0 | 0.0 | 19 | 6.7 | 1 | 0.4 | X2= 42.056; p=0.000\* |
| No | 175 | 61.4 | 69 | 24.2 | 21 | 7.4 |
| **Other procedures** |  |  |  |  |  |  |  |
| Yes | 1 | 0.4 | 8 | 2.8 | 1 | 0.4 | X2= 12.629; p=0.002\* |
| No | 174 | 61.1 | 80 | 28.1 | 21 | 7.4 |
| **Blood component** |  |  |  |  |  |  |  |
| Yes | 18 | 6.3 | 32 | 11.2 | 6 | 2.1 | X2= 26.099; p=0.000\* |
| No | 157 | 55.1 | 56 | 19.6 | 16 | 5.6 |
| **Complications** |  |  |  |  |  |  |  |
| Yes | 73 | 25.6 | 76 | 26.7 | 13 | 4.6 | X2= 47.634; p=0.000\* |
| No | 102 | 35.8 | 12 | 4.2 | 9 | 3.2 |
| **Imaging examination** |  |  |  |  |  |  |  |
| Computed tomography | 111 | 38.9 | 17 | 6.0 | 10 | 3.5 | X2= 55.085; p=0.000\* |
| X-ray | 5 | 1.8 | 13 | 4.6 | 1 | 0.4 |
| Computed tomography and X-ray | 59 | 20.7 | 57 | 20.0 | 10 | 3.5 |
| None | 0 | 0.0 | 1 | 0.4 | 1 | 0.4 |
| **Lung involvement in chest computed tomography** | |  |  |  |  |  |  |
| <25% | 17 | 6.0 | 3 | 1.1 | 0 | 0.0 | X2= 39.802; p=0.000\* |
| 25-50% | 67 | 23.5 | 19 | 6.7 | 7 | 2.5 |
| 50-75% | 65 | 22.8 | 26 | 9.1 | 6 | 2.1 |
| >75% | 1 | 0.4 | 6 | 2.1 | 1 | 0.4 |
| Not realized | 20 | 7.0 | 20 | 7.0 | 6 | 2.1 |
| Not informed | 5 | 1.8 | 14 | 4.9 | 2 | 0.7 |
| **Type of diet** |  |  |  |  |  |  |  |
| Oral | 154 | 54.0 | 17 | 6.0 | 11 | 3.9 | X2= 121.66; p=0.000\* |
| Enteral | 21 | 7.4 | 71 | 24.9 | 11 | 3.9 |

Source: The authors (2023).

The variables age, length of stay, saturation and orotracheal intubation time differed significantly in terms of the outcome of hospitalized patients. With regard to age, there was a higher median for death (68.0) than for discharge (55.0) and transfer or evasion (52.5). Length of stay followed the same pattern, with a higher median for patients who died (10.0) than those who were discharged (7.0). Oxygen saturation showed a significant difference, with a lower value at death. Finally, orotracheal intubation time had a median of 0.0 days at discharge and transfer or evasion, while at death it was 5.0 days (Table V).

**Table V. Clinical profile and care provided to patients hospitalized with Covid-19 in a public hospital in southern Brazil compared to the outcome, from 2020 to 2022. H= Kruskal-Wallis test.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| **Variable** | **Median** | **Minimum value** | **Maximum value** | **Significance** |
| **Age (years)** |  |  |  | H= 0.000;  p= 0.000\* |
| Discharge | 55.0 | 19.0 | 88.0 |
| Death | 68.0 | 27.0 | 88.0 |
| Transfer or evasion | 52.5 | 24.0 | 92.0 |
| **Length of stay (days)** |  |  |  | U= 0.012;  p= 0.012\* |
| Discharge | 7.0 | 1.0 | 76.0 |
| Death | 10.0 | 1.0 | 42.0 |
| Transfer or evasion | 6.5 | 0.0 | 35.0 |
| **Saturation (%)** |  |  |  | U= 0.021;  p= 0.021\* |
| Discharge | 93.0 | 82.0 | 100.0 |
| Death | 91.0 | 40.0 | 100.0 |
| Transfer or evasion | 92.5 | 80.0 | 98.0 |
| **Orotracheal intubation time (days)** | | | | U= 0.000;  p= 0.000\* |
| Discharge | 0.0 | 0.0 | 22.0 |
| Death | 5.0 | 0.0 | 38.0 |
| Transfer or evasion | 0.0 | 0.0 | 24.0 |

Source: The authors (2023).

**4. DISCUSSION**

The sample´s sociodemographic profile revealed that males were the most prevalent in hospitalizations, in line with data from the Brazilian Sistema Único de Saúde, in which the majority of patients hospitalized for Covid-19 were male (56.5%) (Andrade et al., 2020). The predominance of white skin color in both periods is justified by the higher prevalence of white colored people in the study region (Instituto Brasileiro de Geografia e Estatística, 2022). However, there was a 10% increase in brown people in the second period compared to the first.

The majority of patients had some level of schooling, with primary and secondary education being the most prevalent, corroborating the Brazilian scenario, in which the proportion of people who have completed basic education is approximately 48.8% of the population (Instituto Brasileiro de Geografia e Estatística, 2020). As for religion and marital status, the majority of patients were Catholic and did not have a partner, being single, divorced or widowed, which is corroborated by a cross-sectional descriptive study, in which the majority of participants were single (49.5%), therefore without a partner, and Catholic (43.7%) (Lopes Júnior et al., 2023).

The percentage of patients with comorbidities was similar in the two years evaluated. However, systemic arterial hypertension rose from 42% to 50% of patients from year 1 to year 2, diverging from the percentage found in a retrospective, multicenter cohort study conducted with patients hospitalized with Covid-19 in the city of Wuhan, China, in which hypertension was reported in 30% of patients (F. Zhou et al., 2020). Although half of the study sample had hypertension, its association with Covid-19 does not necessarily imply a causal relationship, due to the prevalence of systemic arterial hypertension worldwide, affecting 25% of the adult population with a peak prevalence of over 60% in the elderly population (B. Zhou et al., 2021).

The prevalence of diabetes mellitus in the sample increased by 11% from one year to the next (18.2% in year 1 and 26.1% in year 2). Sun et al. (2022) state that the global prevalence of diabetes in adults aged 20-79 in 2021 was approximately 10.5%, with the highest prevalence (24.0%) in the 75-79 age group (Sun et al., 2022). In both periods, 32% of the sample was overweight or obese, defined as body mass index >25 and >30, respectively. According to data from the Food and Nutrition Surveillance System, the western region of Santa Catarina has 37.3% of adults who are obese, 33.6% who are overweight and, among the elderly, 58.1% who are overweight (Brasil, 2021). The lower percentage found in this study can be explained by the lack of information on body mass index in most of the medical records consulted.

Almost 15% of hospitalized patients were smokers or former smokers, which corroborates the meta-analysis carried out by Simons et al. (2021) in which the probability of smokers and former smokers having a higher risk of hospitalization for Covid-19 compared to non-smokers was 35% and 89%, respectively (Simons et al., 2021). A total of 11.25% of the patients whose medical records made up this sample had some previous heart disease or ischemic event, which is corroborated by a study by Goyal et al. (2020) in which cardiovascular pathologies were present in 8 to 25% of patients with Covid-19, with a higher proportion of patients with a worse prognosis (Goyal et al., 2020). In this study's sample, dyslipidemia, a risk factor for cardiovascular disease, was present in 8% to 9% of hospitalized patients.

Other comorbidities such as chronic kidney disease, asthma, chronic obstructive pulmonary disease, cancer, autoimmune diseases and psychiatric disorders have been observed in around 30% of hospitalized patients. It is reported that a significant proportion of Covid-19 patients suffer from other previous comorbidities (M. K. Singh et al., 2021). In the initial cohort of 1,590 Covid-19 patients from China, Guan et al. (2020) reported that 399 (25.1%) had at least one comorbidity, while 130 (8.2%) had two or more comorbidities (Guan et al., 2020).

The predominant place of hospitalization in the first year of the study was the nursing, followed by intensive care. This deviates from the pattern found in the global context, in which only 20.9% of patients were admitted to the intensive care unit (Garcia-Gallo et al., 2022). In relation to ventilation modalities, there was a 22% increase in the use of non-invasive ventilation from year 1 to year 2, which reveals a possible worsening of conditions, since the use of non-invasive ventilation should not be routine, benefiting only selected patients with respiratory failure (Hussain Khan et al., 2022). On the other hand, invasive options such as orotracheal intubation, discussed by Dar et al. (2021), present a more subtle approach, due to the risks associated with invasive mechanical ventilation, in agreement with the rate of use (29-33%) in the patients in this study (Dar et al., 2021).

As for the drugs administered, antibiotics were widely used in both study periods because they are supportive care aimed at treating secondary and opportunistic bacterial infections, a practice cited as treatment in other studies on Covid-19 (N. Singh et al., 2021). Similarly, anticoagulants have been widely adopted, as released pro-inflammatory cytokines can predispose to coagulation abnormalities and even, in severe cases, lead to disseminated intravascular coagulation (Anka et al., 2021). The use of blood components was more restricted in around 20% of cases, which is similar to a prospective database of 265 patients with Covid-19 infection admitted to intensive care, in which 26.4% required some type of transfusion (Doyle et al., 2020).

Chest X-rays are generally inconclusive in the early stages of the disease and may not show any significant alterations (Long et al., 2022). As the infection progresses, bilateral multifocal alveolar opacities are observed, whether or not associated with pleural effusion. Consequently, in this sample, its isolated use was low (6-7%), increasing when it was associated with computed tomography (42-46%), which is more sensitive and the method of choice for diagnosing Covid-19 pneumonia (Parasher, 2021).

The rate of pulmonary involvement, as assessed by computed tomography, showed a significant difference between the two years studied. Lung involvement of 50 to 75% and 25% or less maintained the average number of cases in both years (34% and 7%, respectively). Pulmonary involvement of 25 to 50% went from 25.2% to 40.1% in year 2. This result shows an increase in pulmonary infiltrates from one year to the next, as well as the presence of a significant proportion of the sample (34%) classified as severe cases of Covid-19, in which infiltrates are greater than 50%, as pointed out by Berlin, Gulick & Martinez (2020)(Berlin et al., 2020).

With regard to the Covid-19 vaccine, there is still a gap to be better understood with studies that differentiate between vaccinated and unvaccinated populations (Cerqueira-Silva et al., 2022). In the first few months, widespread social mobilization and a greater perception of risk may have contributed to almost universal coverage of the first doses among the elderly. However, in the following months of 2021 and 2022, there was lower coverage of boosters among the elderly and lower coverage of all doses of the vaccine among adults (Boing et al., 2023). In the second year of this study, only 54% of patients had this information in their medical records, and this period should be investigated in depth, since immunization could explain some of the changes seen from one year to the next.

The prevalent complications in hospitalized patients in the two periods were hemodynamic shock, acid-base and hydroelectrolyte disorders, hypotension, acute or chronic renal failure, pneumonia, severe acute respiratory distress syndrome, septic shock and others. These results corroborate a study carried out in a hospital in the state of São Paulo, Brazil, with patients in the intensive care unit, which showed complications such as pneumonia (38.1%), acute kidney injury (21.4%), deep vein thrombosis (16.7%), pressure injury (11.9%) and pulmonary embolism (9.5%) (Monteiro et al., 2022). In another retrospective cohort carried out in China, complications included acute kidney injury (29%), liver dysfunction (29%) and heart damage (23%) (Yang et al., 2020).

Regarding the outcome of hospitalized patients, the majority of non-survivors were admitted to the intensive care unit (24.6%), which corroborates Nachtigall et al. (2020), in which the mortality rate was 29% among patients admitted to the intensive care unit (Nachtigall et al., 2020). In addition, published national data from the first 250,000 patients hospitalized for Covid-19 in Brazil states that the average mortality rate in the intensive care unit was 55% (Ranzani et al., 2021), exceeding the percentage found in this study.

Not having a partner predominated in patients with a death outcome. According to Kudoh et al. (2023), in single patients with mild Covid-19 disease, social isolation, rather than viral virulence itself, can affect their psychological conditions, which could explain the difference between marital status and Covid-19 severity (Kudoh et al., 2023). Patients with dyslipidemia and type II diabetes mellitus were mostly discharged and only 1.1% and 6% died, respectively. This result differs from the available scientific literature, which reports twice the odds of hospital death related to Covid-19 in people with type 2 diabetes mellitus (Barron et al., 2020). Furthermore, diabetes mellitus is known to be associated with an increased risk of Covid-19-related hospitalization and serious outcomes, including mortality (Singh, Awadhesh Kumar & Khunti, Kamlesh, 2022). According to Hariyanto & Kurniawan (2020), in dyslipidemia, the accumulation of LDL cholesterol and triglycerides causes endothelial dysfunction, which can be accentuated in Covid-19 infections, leading to the development of cardiovascular complications that can cause a serious evolution of patients.

Of the patients who died, half used a spectacle-type nasal cannula, while the majority used noninvasive ventilation and orotracheal intubation. In discharges, the highest percentage of patients used nasal cannula, and noninvasive ventilation and orotracheal intubation were not used in most cases. A study by Kurtz et al. (2021) reported that in-hospital mortality was higher in patients who underwent only invasive mechanical ventilation compared to those who required only non-invasive ventilation with positive pressure or high-flow nasal cannula (58 vs. 4.6%) (Kurtz et al., 2021). Thus, an independent association was observed between increased use of non-invasive ventilation with positive pressure or high-flow nasal cannula and improved survival, which is corroborated by the results found in this study, except for noninvasive ventilation, which was present in the majority of cases with a death outcome. The most commonly used diet in non-surviving patients was the enteral route (24.9%), which may be partly explained by the similarity in the percentage of orotracheal intubation use in this population (21.8%).

Inpatients underwent various procedures, including hemodialysis, which was performed in 6.7% of patients, all of whom died afterwards. In the study by Ferreira et al. (2021), renal replacement therapy was used in 35% of patients and was associated with high costs and a greater burden of care, as well as high mortality(Ferreira et al., 2021). Chest drainage and other procedures such as central venous catheter, colostomy and cardiac catheterization were performed in a higher percentage of non-survivors than survivors.

Blood components were used in 6.3% of patients who were discharged and in 11.2% of those who died. The greater use of blood components in non-surviving patients corroborates a retrospective observational study carried out in a hospital in Spain, which revealed that, in general, the transfusion requirements of Covid-19 patients were higher among those who needed to be admitted to the intensive care unit and that mortality among hospitalized patients who required transfusion was high (45%). It also states that the transfusion requirements of Covid-intensive care unit patients were 40% higher than those of non-Covid intensive care unit patients (Velázquez-Kennedy et al., 2021).

Complications during hospitalization were reported in the majority of patients who died. This corroborates Zhang et al. (2023) who stated that complications during hospitalization have been identified as risk factors for Covid-19 mortality and, therefore, early identification and immediate intervention might be able to reduce mortality (Zhang et al., 2023).

Imaging tests were widely used, with computed tomography alone being the most commonly performed test in survivors, while in non-survivors, the highest percentage of patients underwent computed tomography together with X-ray, which is partly explained by the fact that chest radiography is the only possible test for critically ill patients or those admitted to the intensive care unit (Martínez Chamorro et al., 2021). In deaths, pulmonary involvement was predominant in 50 to 75% of cases, as assessed by computed tomography, while in discharges, the parenchyma was involved in 25 to 50% of cases. Thus, greater pulmonary involvement was observed in the most severe cases, corroborating Yuan et al. (2020) who stated that the median computed tomography score of the mortality group was higher compared to the survival group, with a higher frequency of consolidation and air bronchograms (Yuan et al., 2020).

It was found that length of stay and orotracheal intubation, age and oxygen saturation differed significantly in the outcome found. The highest death rate was concentrated in the 68-year-old age group, which differs from Umakanthan et al. (2020), in which the average was 80 years in Italy and China (Umakanthan et al., 2020). On the other hand, the length of hospitalization and orotracheal intubation was longer in those who died, at 10 and 5 days, respectively, which also differs from Alharthy et al. (2021) in which the average time for the same outcome was higher, at 18 days in hospital and 16 days of orotracheal intubation (Alharthy et al., 2021).

**5. Conclusion**

The sample primarily consisted of male patients, with a mean age of 58 years, predominantly white and educated. From the first to the second year, there was an increase in comorbidities, particularly type 2 diabetes and hypertension, as well as higher ICU admissions, greater use of invasive ventilation, and longer hospital stays. Despite this apparent worsening of clinical conditions, the mortality rate did not rise in the second year, likely due to the introduction of vaccination.  
Differences in outcomes were observed between deaths and discharges. Patients who died were generally older, had higher ICU admission rates, required more invasive ventilation, and had greater pulmonary impairment (50-75%). In contrast, those who were discharged were more frequently in nursing units, used non-invasive ventilation methods, and had milder pulmonary impairment (25-50%).  
Understanding these clinical profiles and outcomes is essential for evaluating the impact of Covid-19 on hospitalized patients. This knowledge can inform public health policies and improve patient care strategies, taking into account specific population characteristics that may influence clinical outcomes.

***Authors’ contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

**CONSENT AND ETHICAL APPROVAL**

The research was carried out in accordance with CNS Resolution 466/2012 (Brasil, 2012) and Resolution 510/2016 (Brasil, 2016) and approved under Opinion: 5.543.130. It was also carried out in accordance with the General Personal Data Protection Law (LGPD), Law No. 13,709/2018 (Brasil, 2018).

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

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