

Hospitalizations for COVID-19 in a tertiary hospital in Brazil: a parallel with vaccination

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ABSTRACT

This study aimed to evaluate the COVID-19 hospitalizations in a tertiary hospital by age group and month, considering the introduction and the advance of the vaccination against the disease. The laboratory-confirmed COVID-19-associated hospitalizations among people aged 20 years or older, that occurred between March 2020 and June 2021, were distributed by month of symptom onset and age group. The proportion of hospitalizations by age group was calculated for the year 2021. The proportions were compared using the chi-square test for trends. The marks of vaccination advances among different age groups were taken from the official website LocalizaSUS. In 2020, hospitalizations among people aged 60–80 years old were the most frequent (39.1%). From January–June 2021, when the vaccination commenced, while hospitalizations of patients aged 20 to <40 and 40 to 60 years old showed an increasing trend, the older age groups and those with vaccination recommendations (from 60 to <80 and from 80 or over) showed a downward trend. As of June 2021, with widespread vaccination, a drop in hospitalizations was observed in >60 years old. At 20 to <40 and 40 to <60, an increase in hospitalizations was observed. It demonstrates the important role of vaccination in combating the COVID-19 pandemic.

KEYWORDS: SARS-CoV-2. Severe acute respiratory syndrome. COVID-19. COVID-19 vaccines.

INTRODUCTION

Since December 2019, with the emergence of the Severe Acute Respiratory Syndrome caused by SARS-CoV-2, the virus that causes the coronavirus disease (COVID-19), the world has been severely affected by a health crisis that has imposed challenges for the entire population¹.

Due to the rapid spread of the disease and increasing number of cases, there was an emergency demand for availability of hospital beds, especially for intensive care, resulting in overwhelmed health systems in many countries².

The vaccine development against COVID-19 has been accelerated and used in diversified platforms. The first doses of authorized vaccines in the world issued on an emergency basis were initially administered in December 2020^{3,4}.

In Brazil, the vaccination against COVID-19 began on January 17, 2021, firstly targeting healthcare workers, then advancing to priority groups and age groups, starting with the elderly. As of June 30, the vaccination was available to adults of 40 years old and over. The adsorbed COVID-19 (inactivated) vaccine (Sinovac/

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Butantan) was initially used. On January 25, 2021, the distribution of the ChAdOx1 vaccine (Oxford/AstraZeneca) began, followed by BNT162b2 (BioNTech/Pfizer) and Ad26.COV2.S (Janssen) on May 4, 2021, and June 26, 2021, respectively⁴.

After the start of vaccination, Brazil was hit by a new wave of cases, registering 14.6 million cases in 2021, a higher number than that recorded during the entire year of 2020 (7.68 million)^{5,6}. Advancements in vaccination may have contributed to a change in the profile of people affected by COVID-19 during the second wave. The objective of this study was to evaluate the profile of hospitalizations for COVID-19 in a tertiary hospital in different age groups over time, considering the vaccine rollout.

MATERIALS AND METHODS

This study was conducted at the Base Hospital of Sao Jose do Rio Preto (HB-SJRP). It is a tertiary university hospital that serves 2 million people living in 102 municipalities in the Sao Paulo State. The hospital has 1,040 beds for adult patients. During the pandemic, up to 425 beds were made available for COVID-19 patients.

The study included patients aged 20 years old or older, residents in the Sao Paulo State, hospitalized at HB-SJRP from March 30, 2020, to December 31, 2021, and with a SARS due to COVID-19, diagnosed through a real-time polymerase chain reaction (RT-PCR) test for SARS-CoV-2. The source of information was the SARS-reported

cases database from the Epidemiological Surveillance Information System (SIVEP-Gripe)⁷.

Hospitalizations from March 2020 to June 2021 were distributed by month of symptom onset and age group: 20 to < 40 years old, 40 to < 60 years old, 60 to < 80 years old, and ≥ 80 years old. The proportion of hospitalizations by age group was calculated over the months of 2021.

These proportions were compared using the chi-squared test for trends with a statistical significance of 5%. The analyses were performed using the software IBM SPSS Statistical Package v.26 (IBM Corporation, Armonk, NY, USA). The ethics committee of the institution (opinion N° 4.855.266) approved the study.

The marks of vaccination advance by date and age were taken from the official website LocalizaSUS⁸. The data was presented as cumulative number of doses, by month and age group (20 to < 40 years old, 40 to < 60 years old, 60 to < 80 years old, and ≥ 80 years old).

RESULTS

From March 2020 to June 2021, 5,321 patients were hospitalized at HB-SJRP with confirmed COVID-19, aged 20 years old or older, and residing in the Sao Paulo State. Among these patients, 2,680 cases (50.3%) occurred between March and December 2020, and 2,641 (49.6%) between January and June 2021.

Figure 1 shows the hospitalizations for COVID-19 distributed by the date of symptom onset and stratified by

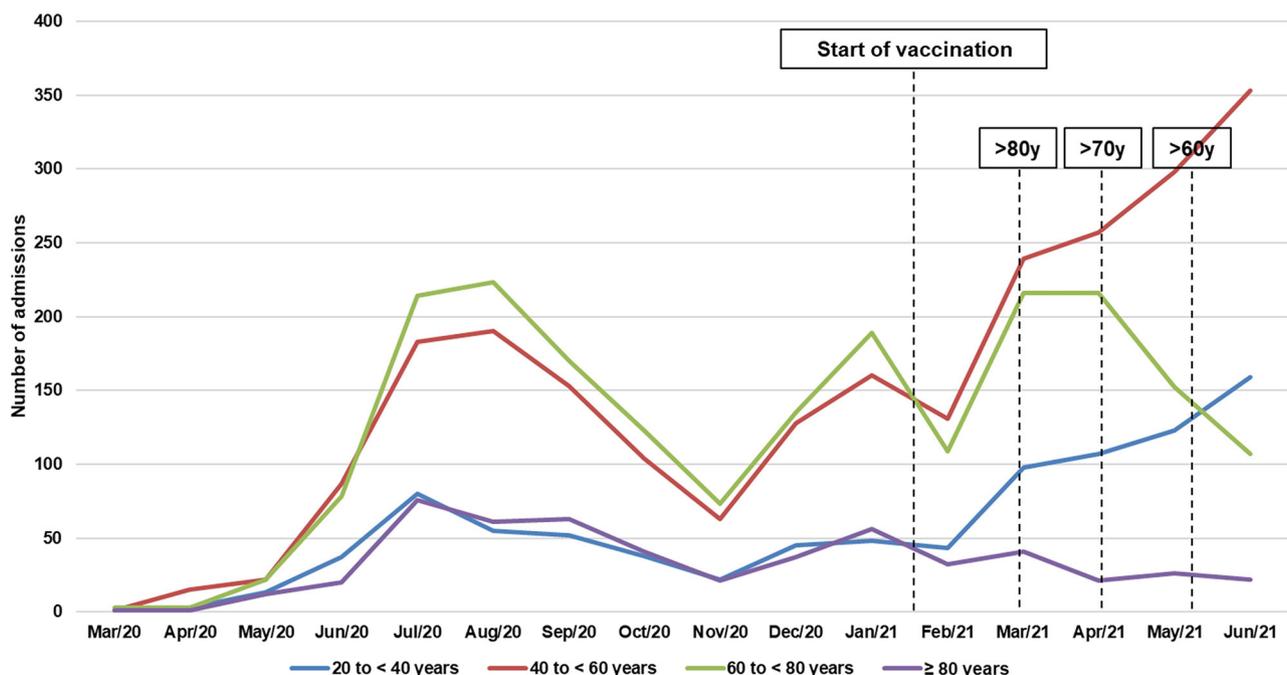


Figure 1 - Distribution of hospitalizations for COVID-19 according to age group and month of symptom onset, from March 2020 to June 2021. Base Hospital of Sao Jose do Rio Preto, Sao Paulo State, Brazil.

age group. The oscillations in the number of hospitalizations in different age groups were followed from March to December 2020. During this period, hospitalizations among people aged 60–80 years old were the most frequent (1,044 [39.1%]), followed by hospitalizations among people aged 40–60 years old (946 [35.4%]).

The period from January to June 2021, during COVID-19 vaccination, was characterized by a change in the profile of hospitalizations. The most frequent age group represented in this period was 40–60 years old (1,376 [52.3%]). While age groups from 20 to < 40 and from 40 to 60 years old showed an increasing trend of hospitalizations, older age groups (from 60 to < 80 and from 80 and over) showed a downward trend (Figure 2).

Until June 2021, the hospitalizations of patients aged 20 to < 40 and 40 to 60 years old showed an increasing trend, while that of older age groups and those with vaccination recommendations (from 60 to < 80 and from 80 and over) showed a downward trend. (Figure 1).

DISCUSSION

In contrast to what was observed throughout 2020, the hospitalizations of people aged 60 or older decreased during the first half of 2021, while hospitalizations in younger age groups increased significantly, giving rise to the second wave of COVID-19. Considering that the vaccination started in the older population in January 2021, the decrease in hospitalizations among age groups covered

by vaccination (over 60 years old) and the increase in the same among those non-vaccinated (20 to < 40 years old and 40 to < 60 years old) indicated the influence of vaccination on hospitalizations for COVID-19 over time.

These data corroborate the findings of other studies, which showed a significant decline in the number of cases among the elderly accompanying the commencement of vaccination, with a consequent tendency for rejuvenation in hospitalizations and deaths⁹⁻¹¹. Data from the Ministry of Health on COVID-19 showed that between the beginning of January and the end of June 2021 there was a reduction in the average age among hospitalized cases from 62.3 to 52.5 years old, and from 71.4 to 61.2 years old for deaths in Brazil¹². A similar profile was observed in this study, from 60.6 to 49.9 among hospitalized cases and 72.4 to 56.8 among deaths.

The strategy defined by the National Immunization Program in Brazil prioritizes groups for vaccination starting with more advanced age groups, which justifies the decrease in hospitalization among the elderly. The first vaccines introduced in the country and the most commonly used among older people were AstraZeneca and CoronaVac⁴. Studies have shown that they are effective against the disease among the elderly, which could explain the decrease in hospitalizations in this age group during the initial months of 2021, internationally and in Brazil¹³⁻¹⁵. Although vaccination has been shown to be effective, the use of non-pharmacological measures such as the use of masks is still necessary at this time, due to a further increase in cases^{16,17}.

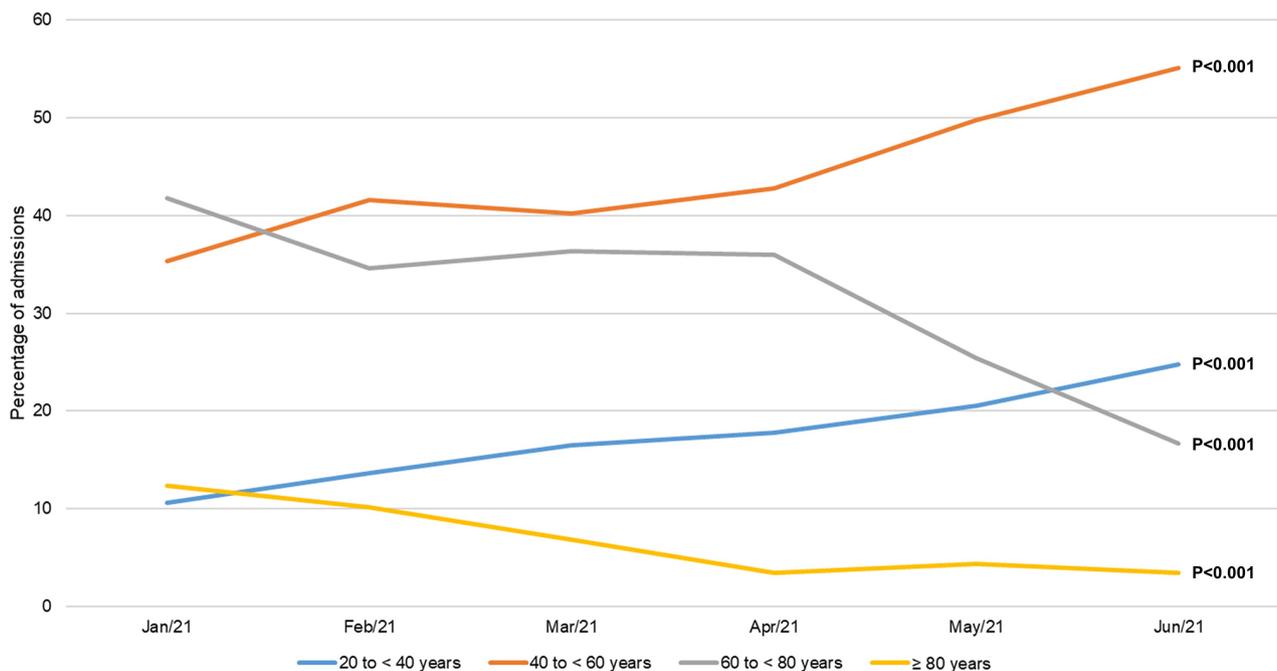


Figure 2 - Proportion of hospitalizations for COVID-19 by age group and month of symptom onset, from January to June 2021. Base Hospital of Sao Jose do Rio Preto, Sao Paulo State, Brazil.

Among the limitations of this study is the fact that it was carried out in a single department with high complexity, which makes it difficult to extrapolate its results for the entire population. Although there is no record of directing beds for specific age groups between 2020 and 2021, the eventual bed regulation decisions could have influenced the hospitalization trends. In addition, other factors besides vaccination, such as population dynamics and the emergence of new variants of SARS-CoV-2, may have affected changes in the hospitalization trends observed in 2021. Finally, the chosen study period did not allow the evaluation of the impact of the new increase in community transmission generated by new variants resistant to the vaccines¹⁶.

CONCLUSION

Hospitalizations for COVID-19 over the months of 2020 showed the same oscillation among different age groups. In 2021, the age groups covered by vaccination showed a decrease in hospitalizations for COVID-19, while the hospitalizations of those not vaccinated showed a significant increase. These results demonstrate the important role of vaccination in combating the COVID-19 pandemic, in addition to non-pharmacological measures such as the use of masks. In order to overcome the pandemic, the vaccination rollout is required for the entire population with high and homogeneous vaccine coverage.

AUTHORS' CONTRIBUTIONS

MLMS, MNM, EGF, FQ, LMM, HTA and MST participated in all stages of the work from the conception, planning, analysis, interpretation and writing of the work; MNL, SAL and MWC contributed to the critical review of the content. All authors approved the final manuscript as submitted.

CONFLICT OF INTERESTS

EGF is linked to the Butantan Institute (a vaccine producer) as a safety doctor. The other authors have no conflict of interest.

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