

## Trends of COVID-19 pediatric admissions number during the first 24 weeks of COVID-19 vaccination in Rio de Janeiro, Brazil

### Tendências do número de admissões pediátricas da COVID-19 durante as primeiras 24 semanas de vacinação da COVID-19 no Rio de Janeiro, Brasil

DOI:10.34119/bjhrv5n2-153

Recebimento dos originais: 14/01/2022

Aceitação para publicação: 28/02/2022

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#### ABSTRACT

**Objective:** To describe trends of COVID-19 pediatric admissions number during the first 24 weeks of COVID-19 vaccination. **Design:** A retrospective study was conducted in children (0-18 years), admitted in two pediatric hospitals of Rio de Janeiro city, between January 17 and July 3, 2021 with confirmed COVID-19 by reverse transcription polymerase chain reaction or serological tests. Trends of COVID-19 pediatric admissions number during the first 24 weeks of COVID-19 vaccination in Rio de Janeiro, Brazil and the pre-vaccine period were measured by linear regression. **Participants:** Children admitted in pediatric hospitals in Rio de Janeiro, city, Brazil **Results:** The number of total admitted patients (with all diseases) were 5340 during the pre-vaccine period, being 94 (1.8%) of them with confirmed COVID-19, and 4182 children admitted during the vaccine period, with 86 confirmed COVID-19 patients (2.1 %) ( $p=0.29$ ). Media of cases admitted per/week were 2.02 in pre-vaccine period and 3.6 during the first 24 weeks of COVID vaccination ( $p=0.009$ ). One death was reported in the pre-vaccine period and four in the vaccine period ( $p=0.14$ ). Trends of increase in the number of admitted cases were

verified both in the pre-vaccine period as in the vaccine period, being more expressive in the last one. **Conclusion:** There was trend of increase in number of children admitted with confirmed COVID-19 during the first 24 weeks of COVID-vaccination in Rio de Janeiro, city. Considering that few people were fully vaccinated, reducing of number of admitted children with confirmed COVID-19 was not verified.

**Keywords:** COVID 19, paediatrics, infectious disease medicine.

## RESUMO

**Objetivo:** Descrever as tendências do número de admissões pediátricas da COVID-19 durante as primeiras 24 semanas de vacinação da COVID-19. **Desenho:** Foi realizado um estudo retrospectivo em crianças (0-18 anos), admitidas em dois hospitais pediátricos da cidade do Rio de Janeiro, entre 17 de Janeiro e 3 de Julho de 2021 com COVID-19 confirmado por transcrição reversa de reacção em cadeia da polimerase ou testes serológicos. As tendências do número de admissões pediátricas COVID-19 durante as primeiras 24 semanas de vacinação COVID-19 no Rio de Janeiro, Brasil, e o período pré-vacinação foram medidos por regressão linear. **Participantes:** Crianças admitidas em hospitais pediátricos no Rio de Janeiro, cidade, Brasil **Resultados:** O número total de pacientes admitidos (com todas as doenças) foi de 5340 durante o período pré-vacinação, sendo 94 (1,8%) deles com COVID-19 confirmada, e 4182 crianças admitidas durante o período de vacina, com 86 pacientes COVID-19 confirmada (2,1%) ( $p=0,29$ ). Os média de casos admitidos por semana foram 2,02 no período pré-vacinação e 3,6 durante as primeiras 24 semanas de vacinação COVID ( $p=0,009$ ). Uma morte foi notificada no período pré-vacinação e quatro no período da vacina ( $p=0,14$ ). Foram verificadas tendências de aumento no número de casos admitidos tanto no período pré-vacinação como no período de vacina, sendo mais expressivas no último período. **Conclusão:** Verificou-se uma tendência de aumento do número de crianças admitidas com COVID-19 confirmada durante as primeiras 24 semanas de COVID-vacinação no Rio de Janeiro, cidade. Considerando que poucas pessoas foram totalmente vacinadas, a redução do número de crianças admitidas com a COVID-19 confirmada não foi verificada.

**Palavras-chave:** COVID 19, pediatria, medicina de doenças infecciosas.

## 1 INTRODUCTION

Starting in December 2020 in specific countries as United Kingdom and USA, COVID vaccination is one of the most promising strategies to control COVID-19 pandemics associated to non-pharmaceutical interventions (NPIs).<sup>1,2</sup>

Despite children were less affected by COVID-19, severes cases of respiratory syndrome distress and multisystem inflammatory syndrome (MIS-C) are described, causing hospitalization and deaths.<sup>3,4</sup>

Vaccines against SARS-COV-2 are available just for children above 12 years old age and initial analysis of a systematic vaccination progra ms verified reduction on hospital admissions and mortality in older adults.<sup>5,6</sup> In Brazil and specifically in Rio de Janeiro state, COVID-19 vaccination has started in January 19, 2021 (Brazilian epidemiological week 3) and

we speculate an indirect effect of adult vaccination contributing to modify the trend of number of admitted children due to confirmed COVID-19 in pediatric hospitals. Considering these aspects, our aim is to describe COVID-19 pediatric admission number, during the first 24 weeks of COVID-19 vaccination.

## 2 METHODS

### Study design and setting

We conducted a retrospective cohort study in two pediatric hospitals in Rio de Janeiro, city, Brazil. Both hospitals are private units destined exclusively to pediatric patients.

Unit 1 is a 135-bed hospital located at North zone of the city, that receives clinical and surgical patients referred from its own emergency and from other services. Unit 2 is a 39-bed hospital, located at South zone of the city, with the same profile of unit 1.

### Period of the study

Two periods were analysed: the first one comprised the first day of Brazilian epidemiological week 13 (March 22, 2020) and the last day of epidemiological week 2 of 2021 (January 2, 2021). This period corresponds to the period without any COVID vaccine available in the city. The second period comprises the first day of epidemiological week 3 of 2021 (January 17<sup>th</sup>) and last day of epidemiological week 26 of the same year (July 3<sup>rd</sup>). This period corresponds to the first 24 weeks after beginning of vaccination in Rio de Janeiro city.

In both periods studied, higher number of COVID-19 cases were detected in the city.<sup>7</sup>

### Inclusion and exclusion criteria

All patients admitted with COVID-19 in both hospitals were included in analysis. Children admitted but transferred to the other hospitals within the first 24h were excluded.

### COVID-19 vaccines available and priority groups

Four vaccines were available during the first 24 weeks by emergency use in Brazil: ChAdOx1 nCoV-19, BNT162b2, Ad26.COV2.S and CoronaVac.<sup>6</sup> The first doses of vaccines were administered in Rio de Janeiro, in January 20, 2021, first doses of Ad26.COV2.S were administered in the city, after June 26, 2021.

Until July 3, 2021, the following groups received at least one dose of vaccine: persons older than 43 years and healthcare workers (all ages) with direct contact with patients. No vaccine was available for children.

## Diagnostic of COVID-19 infection

A patient was considered as a confirmed case of COVID-19 in the presence of positive polymerase chain reaction (PCR) or positive antigen. Positive IgM or IgG serology were considered as evidence of infection in patients with multisystem inflammatory syndrome. For epidemiological analyses, we considered the date of beginning of the symptoms.

## Data source and statistical analysis

The two periods were analysed regarding the following variables: Total number of admitted patients (with all diseases), total number of admitted patients with confirmed COVID-19 and number of deaths

A descriptive analysis was performed using Microsoft Excel. When appropriate, Z test was performed to compare proportions, t test for compare means and Mann–Whitney U test for continuous variables. A value of p less than .05 were considered as statistical significant. Trends of COVID admissions were measured using linear regression, considering the period studied.

## Ethical aspects

The study was submitted and approved by Ethics Committee of Faculty of Medicine (Universidade Federal Fluminense) and Prontobaby Group, under number 4.100.232 dated from June 20, 2020. A consent statement for the use of data from the patients or their parents or guardians were required for each children included.

## 3 RESULTS

Until July 2, 2021, 9522 children were admitted in both hospitals studied. In the table 1 we show number of hospitalized children in the period pre and during COVID vaccination, number of confirmed COVID-19 cases and number of deaths.

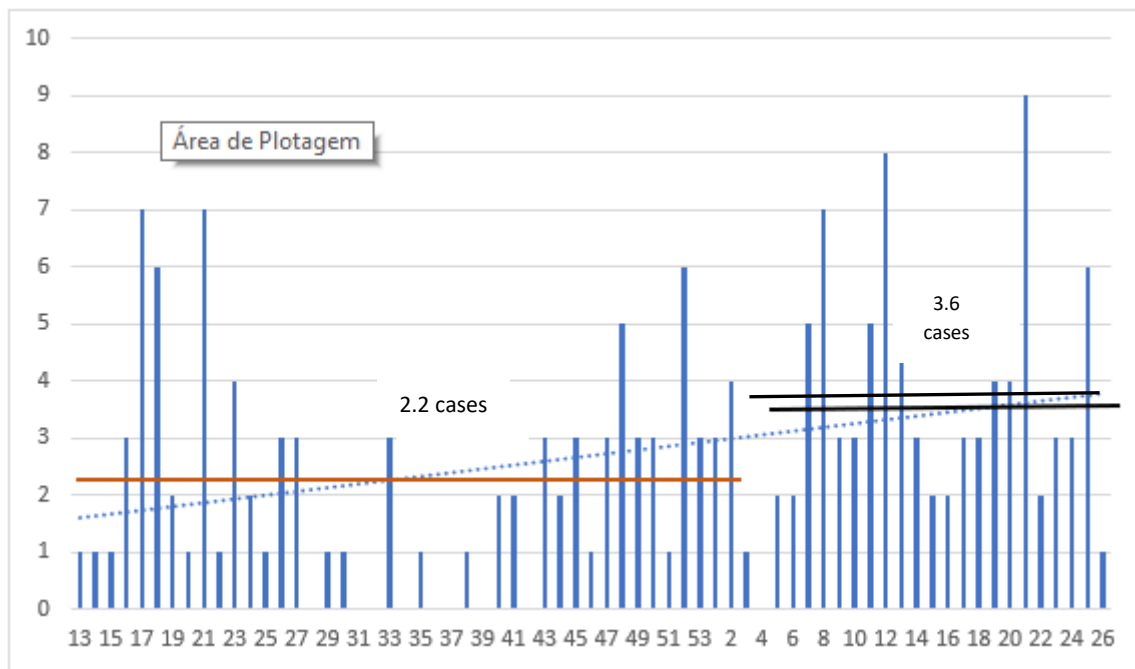
Table 1-Total number of admissions, number of confirmed COVID-19 cases and deaths in pre and during vaccination period in two pediatric hospitals (Rio de Janeiro, Brazil)

	Pre-vaccine period	During vaccine period	Total	P value
N° of admitted children	5340	4182	9522	
N° of confirmed cases (%)	94 ( 1.8)	86 ( 2.1)	180 (1.9)	0.29
N° of deaths	1	4	5	0.14

The first case of confirmed COVID was admitted within the Brazilian epidemiological week 13, in a children with fever and dyspnoea. In all the five deaths, children had a previous comorbidity (obesity and leukemia, 2 cases each one and neurological chronic disease).

The trends of number of admitted children with confirmed COVID is showed in graph 1. Media of admitted cases/week was 2.2 in the pre-vaccine period and 3.6 during the vaccine period.

Graph 1- Trends of number of admitted children in two pediatric hospitals, according to the Brazilian epidemiological week (2020-2021)



Blue continuous columns- number of cases/epidemiological week  
Blue traced-line- Linear trend

#### 4 DISCUSSION

Until the end of August 2021, the COVID pandemics stills in course, causing more than 218 million of cases and 4,5 million of deaths around the world. <sup>8</sup> Considering that non-pharmaceutical interventions mitigate the spread of disease, effective vaccines are necessary to interrupt the pandemics. <sup>2,9</sup>

In countries like Israel and United Kingdom, in which a large percentage of adult were fully vaccinated, it was verified effectiveness against SARS-CoV-2 asymptomatic infection, symptomatic infection, and COVID-19-related hospitalisation, severe or critical hospitalisation, and death for the adult population and specific groups as healthcare-workers. <sup>6,10</sup>

In our study we proposed to verify trends of number of admitted children due to COVID-19, speculating an indirect positive effects of COVID-19 in Rio de Janeiro during the

first 24 weeks of vaccination in the city, even considering that vaccine was not available for children.

We verified that relative percentage of admitted children with confirmed COVID-19 compared with total of admission was statistically similar in pre and during vaccination period as well number of deaths. This finding corroborate that COVID-19 is a mild/moderate disease in children, causing few deaths, mainly in patients with previous disease.<sup>3,4</sup>

When trends of number of admitted children with confirmed children were analysed, curiously we verified more cases admitted/week during the period vaccination compared with the pre-vaccine period. Three possible reasons could explain these results: the first one is the introduction and circulation of Delta variant in the city, causing more cases including children (painel Rio de Janeiro), the second one is available of more tests for COVID-19 detection in the city, mainly antigen-based tests and the last one is the few amount of population received fully vaccination.

Our research was conducted in two reference pediatric hospitals of Rio de Janeiro which could be considered a limitation of the study, but considering that hospitals received patients from all neighborhood of the city, the results could reflect the true dynamics of virus circulation in the city. The second limitation is disponibility of different vaccines, with different rates of effectiveness and unknown effects for long-term protection against Delta variant, which was the most one prevalent in Rio de Janeiro at the moment of the current research.

## 5 CONCLUSION

We verified trends of increase in number of children admitted with confirmed COVID-19 during the first 24 weeks of COVID-vaccination in Rio de Janeiro, city. Considering that few people were fully vaccinated, reducing of number of admitted children with confirmed COVID-19 was not not verified.

## ACKNOWLEDGMENT

We thank to Mario Eduardo Viana and Luisa Benigno Barbosa Araujo da Silva for supporting this research.

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