

**SURVEILLANCE OF
SARS-COV-2 COVID
19 INFECTION IN A
PEDIATRIC HOSPITAL.
URUGUAY PERIOD
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Abstract: **INTRODUCTION:** Since the World Health Organization declared the COVID 19 pandemic in pediatric care centers, action protocols and activities to contain the pandemic began to be implemented. Uruguay registered cases since 3/13/2020. **GOAL:** To describe the results of hospital surveillance and epidemiological and clinical characteristics of children and adolescents with SARS-CoV-2 COVID 19 infection in the period 4/1/2020 and 7/21/2022 in a pediatric hospital. **MATERIAL AND METHODS:** A descriptive observational study was carried out between 04/01/2020 and 07/21/2022, including all children aged 0 to 17 years diagnosed with SARS-CoV-2 infection by PCR or antigen test, captured by the Infections Committee. Hospital (CIH) and Pediatric Epidemiology and Infectology Unit. Data source: CIH active surveillance records. Variables: sex, age, comorbidity, clinical presentation, COVID vaccination status, evolution, hospital outbreaks. Statistical analysis: frequency distribution and summary measures. Ethical considerations: Anonymity was guaranteed throughout the analysis and communication process. The study was approved by the Directorate of the Pediatric Hospital of the Pereira Rossell Hospital Center (HP CHPR). **RESULTS:** In the period considered, 147,370 PCR tests were performed. A total of 527 positive cases were identified, 283 (53.7%) male. Age: Median 7.5 months, 226 (43%) aged 1 year or less. 125 patients had comorbidities (24%). 363 cases (68.8%) had symptoms, with the following distribution: fever 227 (43.1%), runny nose 220 (41.7%), cough 198 (37.6%), respiratory distress 127 (24.1%), digestive manifestations 74 (14%). 374 patients were attended in moderate care and 59 in intensive care. 6 died, none vaccinated. A single nosocomial outbreak was identified. There were no infections to personnel in the period studied. **CONCLUSIONS:** Surveillance

and hospital control strategies have made it possible to identify COVID-19 cases in a timely manner and control transmission. The cases grew exponentially in line with the national epidemiological situation in the period considered.

Keywords: COVID-19, SARS-CoV-2, Hospital surveillance, Pediatric hospital.

INTRODUCTION

As of January 2020, when the WHO declared COVID 19 an emergency of international concern, action protocols and activities began to be implemented in pediatric care centers with a view to preparing for and containing the pandemic. ⁽¹⁾ This included the implementation of diagnostic techniques for SARS-CoV-2 infection, hospitalization management, assistance and case reporting to monitor the evolution of this new disease. ⁽²⁾
⁽³⁾⁽⁴⁾

In Uruguay on 3/13/2020 the first cases were reported, declaring a state of health emergency and establishing strategies to control the epidemic such as voluntary confinement and temporary closure of educational centers. From the beginning of the epidemic until 06/25/2022, 134,606 cases were registered in children under 15 years of age. ⁽⁵⁾⁽⁶⁾

The Pediatric Hospital of the Pereira Rossell Hospital Center (HP-CHPR) is a Reference Center for more than 270,000 children and adolescents who belong to the network of public hospitals. It ensures specialized care for complex pathologies of diagnosis and treatment of patients referred from the first and second level throughout the country. The hospital has 178 beds including 14 intensive care beds. In the HP-CHPR emergency, the number of daily consultations ranges between 150 and 300 and the number of admissions to moderate care varies between 15 and 30 depending on the time of year ⁽⁷⁾.

Within the framework of surveillance at the HP CHPR, a series of activities were implemented to assist children and adolescents during the COVID-19 epidemic, developing a contingency plan, action protocols, and staff training. Diagnostic tests for SARS-CoV-2 were established for all children who were hospitalized, as well as for all patients with prolonged hospitalizations, periodically in order to quickly identify new hospital-acquired infections and limit the possible spread of the infection or occurrence of outbreaks ⁽⁸⁾.

Although the first publications reported that SARS-CoV-2 infection in children and adolescents occurred in a large proportion asymptotically or with mild cases, during the course of the pandemic a change in epidemiology was evidenced with an increase in cases and also in the dynamics of the transmission of the disease in this age group, also discovering moderate to severe respiratory diseases and neurological, thromboembolic, digestive and renal complications, among others. ⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾

An almost exclusive complication of this age group is the Multisystem Inflammatory Syndrome associated with COVID-19 (SIM-C). The most frequent symptoms of this disease are fever and digestive symptoms associated with cardiorespiratory or mucocutaneous symptoms. Cardiac involvement occurs in around a third of cases, such as left ventricular dysfunction and/or coronary abnormalities. ⁽¹¹⁾

Multiple vaccines have been developed in response to the spread of the virus since the start of the pandemic. In Uruguay, vaccination was developed through an electronic agenda, available through the Internet for the entire population. For the pediatric population, vaccination began in July 2021 in adolescents aged 12 to 18 years, while for children aged 5 to 11 years it began in January 2022. ⁽¹²⁾⁽¹³⁾

GOAL

To describe the results of hospital surveillance and the epidemiological and clinical characteristics of children and adolescents with SARS-CoV-2 COVID 19 infection in the period between March 2020 and July 2022 in a pediatric hospital.

MATERIAL AND METHODS

A retrospective descriptive observational study was carried out. All children and adolescents aged 0 to 17 years with a diagnosis of SARS-CoV-2 infection by PCR and antigen tests, captured by the Hospital Infections Committee (CIH) and Unit Epidemiology and Pediatric Infectology in the period between 4/1/2020 and 7/21/2022. PCR for SARS-CoV 2 and/or antigen tests were performed on all hospitalized users, those included in the surveillance of Serious Acute Respiratory Infections SARI, suspected cases of COVID and patients with prolonged hospitalizations every 10 days. The PCR tests for SARS-CoV-2 in the nasopharyngeal swab or aspirate samples (under 2 years of age) were performed in the Molecular Biology Laboratory of the Department of Clinical Pathology. The data source used was the records of active surveillance established by the CIH, medical records and laboratory. The following variables were considered: sex, age, comorbidity, clinical presentation, vaccination status for COVID, evolution, hospital outbreaks. The recommendations for the surveillance of COVID-19 in the pediatric age of the Ministry of Public Health were used.

Suspected case: Any patient who presents 2 or more of the following symptoms: fever (37.5 or more), cough, odynophagia, respiratory distress, sudden loss of taste or smell, headache, diarrhea and/or vomiting; or all SARI without another etiology that fully explains the clinical presentation; or acute multisystem inflammatory syndrome

with no other obvious cause of inflammation. **Confirmed case:** Any suspected case (that meets already defined criteria or contact with a confirmed case) that presents a positive result by rt-PCR for SARS-CoV-2 and/or by antigen test for SARS-CoV-2 and any person who meets with criteria for multisystem inflammatory syndrome associated with COVID-19.

Contact. A contact is considered to be any person who has been in close contact (less than 2 meters for a cumulative total of 15 minutes or more during 24 hours) with a confirmed COVID-19 case since the 48 hours before the onset of symptoms or the performing the swab (in asymptomatic cases) and until the period of transmissibility lasts.

Pediatric Multisystem Inflammatory Syndrome associated with COVID-19 (MIS-C): WHO definition: all children and adolescents aged 0-19 years with fever quantified by health personnel or by a family member for 3 days or more AND at least two of the signs following: rash, bilateral nonpurulent conjunctivitis, or mucocutaneous inflammation (mouth, hands, or feet); Arterial hypotension or shock; manifestations of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (echocardiographs data and/or elevated troponin or NT-proBNP); signs of coagulopathy (abnormal PT or PTT, elevated D-dimer); acute gastrointestinal involvement (diarrhoea, vomiting, or abdominal pain) and elevation of markers of inflammation such as ESR, C-reactive protein, or procalcitonin and absence of an obvious microbial cause of inflammation, such as bacterial sepsis, staphylococcal or streptococcal shock AND 8 Evidence of COVID (positive result of rt-PCR, antigen test, serological test) or probable contact with COVID patients (epidemiological link).

Definition of Outbreak: an outbreak was considered from the epidemiological point

of view to the appearance of two or more confirmed cases in a reduced time and space with a link between them.

Statistical analysis was established based on frequency distribution and summary measures. Ethical considerations: Anonymity was guaranteed throughout the analysis and communication process. The study was approved by the Directorate of the Pediatric Hospital.

RESULTS

In the period considered, 147,370 hospital PCR tests were performed, 25,971 corresponding to children and adolescents. 527 positive cases for SARS-CoV-2 were identified (Graph 1). Among the positive cases, in 136 of them the technique performed was antigen test, in 389 it was PCR. The proportion of positives by PCR was 1.5% with a positivity rate of 0.01%. The evolution of cases by month followed the same trend as cases in the general population in the country. An increase in April and May 2021 is highlighted, coinciding with the circulation of the Gamma variant of SARS-CoV-2, and another increase in January and February 2022, coinciding with the circulation of Omicron (Graphs 2 and 3).

The distribution according to sex showed that 283 (53.7%) were boys and 244 (46.3%) girls. The median age was 7.5 months with a range of 7 days to 17 years. 226 (43%) were children aged 1 year or less (Graph 4). 117 patients (22%) presented at least one comorbidity, the most frequent being Asthma in 32 cases, followed by oncological pathologies in 9 (Graph 5). 363 cases (68.8%) presented symptoms, with the following distribution: fever 227 (43.1%), runny nose 220 (41.7%), cough 198 (37.6%), respiratory distress 127 (24.1%), digestive manifestations 74 (14%). 374 patients were treated in the moderate care room. 59 children required hospitalization in intensive care, highlighting

that among them 26 were 1 year old or less (44%) and a third had comorbidities.

The analysis of the vaccination status against COVID-19 showed that from the family environment of the child, in 163 cases at least one of their adult partners had received at least 1 dose, of which 61 (37.4%) received 2 doses and 58 (35.6%) received 3 doses. Regarding vaccination in patients, of 118 cases diagnosed after the start of vaccination, 27 (22%) had received at least one dose, of which 15 received 2 doses. Of the 15 cases admitted to the ICU, which due to their age and because they were admitted after the implementation of the vaccine in the country could have been vaccinated, 11 were not.

There were 6 deaths, 4 of the deceased patients had comorbidity (Table 1). A single nosocomial outbreak was identified between April and May 2022 with a total of 11 cases. No contagion from users to staff was found in the period studied.

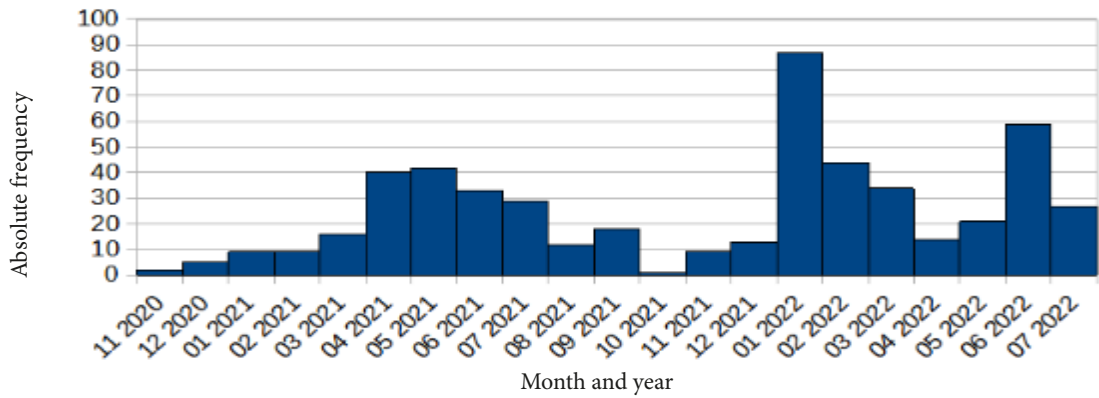
DNT: Malnutrition; NCPD: Chronic non-progressive encephalopathy; ICU: Intensive Care Unit.

DISCUSSION

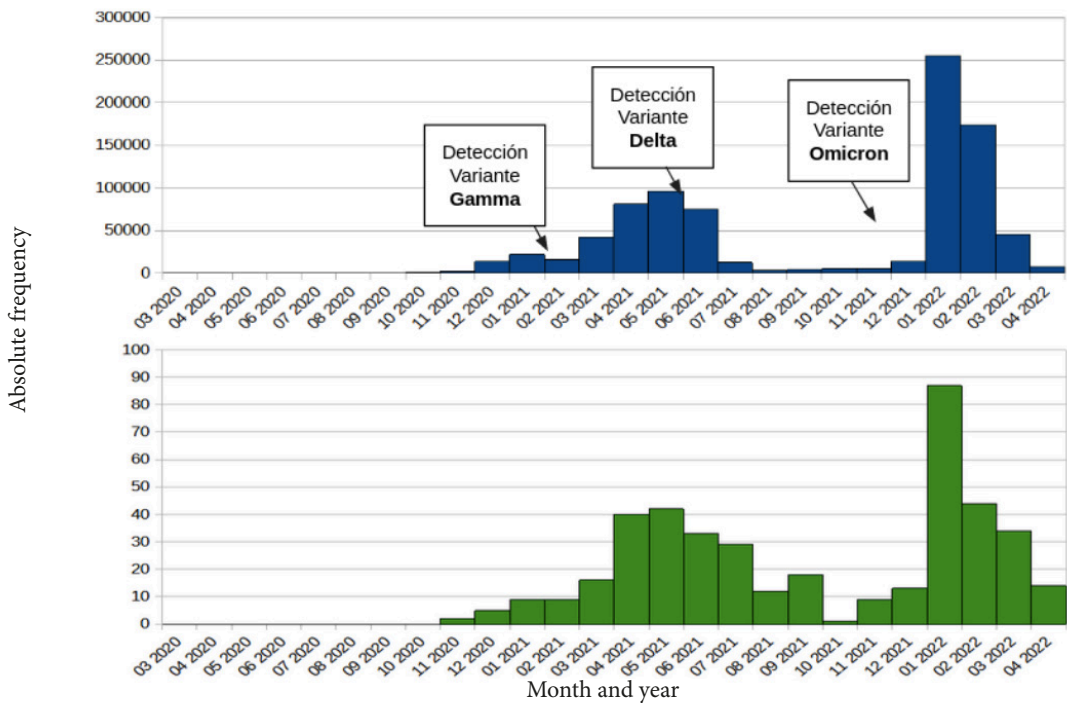
The role of children in the pandemic has been the subject of permanent analysis. Initially, it was shown that they had a lower rate of contagiousness and were located at the end of the epidemiological chains, being very infrequent that they constitute index cases, and in case of illness they did so with generally milder forms.⁽¹⁴⁾⁽¹⁵⁾

This partly explained the low impact that the school closure had on the evolution of the pandemic.⁽¹⁶⁾

However, as the adult population began to protect itself through infection on the one hand and fundamentally through vaccination against COVID-19, which began to be applied in the world since December 2020,

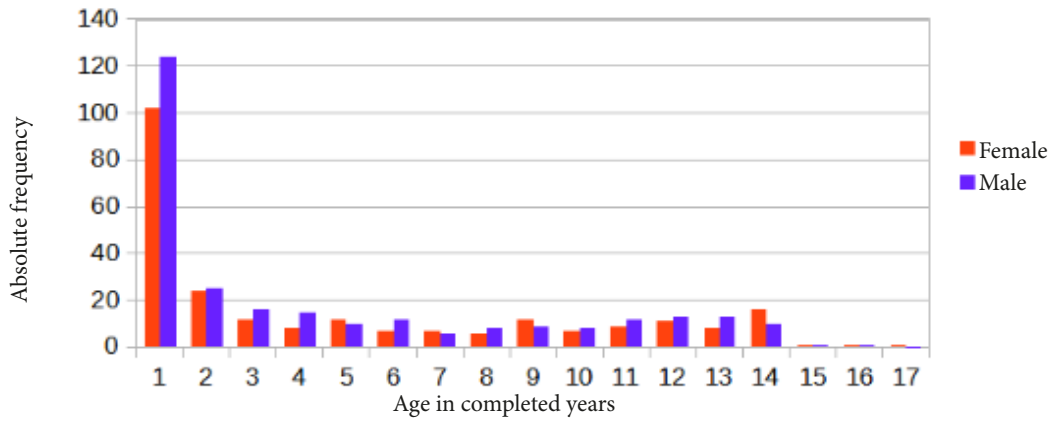


Graph 1. Distribution of cases by month and year, HP-CHPR, March 2020 - July 2022

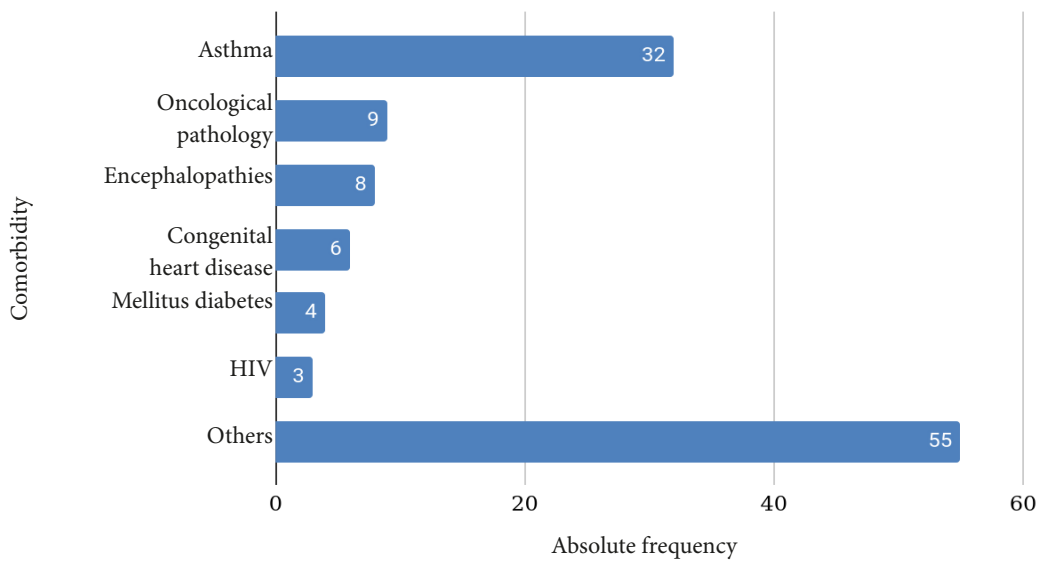


Note: Own elaboration based on data published by the MSP and active surveillance by the CIH.

Graph 2 y 3. Distribution of cases by month and year, The whole country (blue), HP-CHPR (green), March 2020 - April 2022



Graph 4. Distribution of cases by age and sex, HP CHPR, March 2020 - July 2022.



Graph 5. Distribution of cases according to comorbidity, HP CHPR, March 2020 - July 2022.

Case	Age	COVID-19 diagnosis date	Evolution	Comorbidities	Vaccination status
1	2 years	4/30/2021	Admission due to exacerbated chronic DNT. Functional decline with respiratory failure.	ECNP. Simple gastroschisis surgically intervened at birth. Sd Short intestine. Severe chronic NTD.	not applicable
2	14 years	1/17/2022	He was admitted to the ICU due to respiratory failure. Functional decline until death	Hypoxic encephalopathy, permanent vegetative state	not vaccinated
3	1 month	2/14/2022	He was admitted for diarrhea with moderate-severe dehydration that progressed to shock.	No comorbidity	not applicable
4	6 months	2/16/2021	He was admitted to the ICU for pneumonia. Evolution to worse until death	End-stage infiltrating glioma	not applicable
5	6 months	3/1/2022	Multiple organ failure of unclear aetiology	No prior identified comorbidity	not applicable
6	9 years	5/30/2022	Functional decline since admission.	Liver transplant for biliary atresia. Obesity.	1 dose

Table 1. Description of positive cases for COVID-19 who died during hospitalization, HP CHPR, March 2020 - July 2022

a change in epidemiology was confirmed. of COVID-19, reporting a percentage increase in the participation of children and adolescents in the pandemic and an increase in infections between peers and between adults. ⁽¹⁷⁾ Uruguay was no stranger to this situation. The Pereira Rossell Hospital Center was the first hospital in the country to test all admitted patients for SARS-CoV-2, a test that began in April 2020. The first cases of children and adolescents hospitalized with COVID -19 in the hospital were registered in November 2020. In the period considered, 363 children (68.8%) presented with symptoms of COVID-19, the rest being diagnosed based on the surveillance strategy. Vaccination against COVID in Uruguay began in June 2021 for adolescents and in January 2022 for children 5 years and older.⁽¹²⁾⁽¹³⁾ It is noteworthy that within the group of children who, depending on their age and time of hospital admission, could be vaccinated and who required admission to intensive care, 11 patients out of 15 had not been vaccinated (73%).

CONCLUSIONS

The cases of children and adolescents in whom SARS-CoV-2 COVID 19 infection was confirmed in the hospital evolved in line with the national epidemiological situation in the period considered.

The characterization of the cases of children and adolescents admitted to the hospital contributed to the knowledge of the epidemiology of SARS-CoV 2 in children and adolescents, in which a change since 2021 was confirmed.

Surveillance and hospital control strategies have made it possible to identify COVID 19 cases in a timely manner and control transmission.

Surveillance information helped guide hospital management and case and contact management.

CONFLICT OF INTEREST

All authors declare having collaborated significantly

Unfunded work

The authors declare no conflict of interest

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