

# How Big Was the Impact of COVID-19 on Other Pediatric Infectious Diseases?

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## Abstract

**Introduction:** The coronavirus disease 2019 (COVID-19) pandemic in Portugal has imposed two nationwide lockdowns in the last year, with strict non-medical interventions, causing a tremendous impact on the use of emergency services.

**Methods:** The most common infection-related admissions were compared in a pediatric emergency service during the first year of the pandemic with the previous two years.

**Results:** We observed 60% fewer infectious diseases, mainly due to respiratory and gastrointestinal infections, more pronounced during the lockdown periods.

**Discussion:** This important reduction in pediatric infection-related admissions during the pandemic points out the likely role of non-pharmacological interventions in preventing infectious diseases that contributes to the better and more rational use of pediatric emergency services.

**Keywords:** Adolescent; Child; Communicable Disease Control; COVID-19; Disease Transmission, Infectious; Emergency Service, Hospital; Infant; Pediatric; Pandemics; Portugal

## Keypoints

### What is known:

- The COVID-19-pandemic caused an important reduction in admissions in pediatric emergency services.

### What is added:

- We have documented marked reductions in observations due to infectious diseases in a pediatric emergency service, particularly during lockdown periods. The reduction was less evident for urinary tract infections and fever / bacteremia

## Introduction

Coronavirus disease 2019 (COVID-19), announced as a pandemic by the World Health Organization on March 11<sup>th</sup>, 2020, represents an unprecedented public health problem in the last century. According to numerous publications, children generally experience a mild disease with few symptoms and a good prognosis compared to adults.<sup>1-3</sup> In Portugal, the first case of COVID-19 was identified on March 2<sup>nd</sup>, 2020, and since then, the government has imposed two nationwide lockdowns (March to May 2020 and November 2020 to April 2021), with strict non-medical interventions. These included the restriction of circulation on public roads, the duty to remain at home (including telecommuting), the prohibition of

recreational activities, and closure of most services and educational or cultural establishments. These measures led to little interpersonal contact between children, both at school and in other social contexts. Simultaneously, non-pharmacological measures were implemented to prevent the spread of infection, including physical distance, use of masks, and frequent hand hygiene. COVID-19 has caused unexpected effects on the use of pediatric healthcare worldwide, with a particular reduction in the use of emergency services.<sup>1,4-6</sup> We have witnessed an important decrease in admissions in our tertiary pediatric emergency service. This study aimed to evaluate the impact of the pandemic on the most common pediatric infectious diseases over a long time, including two lockdown periods.

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## Methods

This observational and retrospective study analyzed the most common infection-related admissions of the emergency service of the Hospital Pediátrico of Centro Hospitalar e Universitário de Coimbra, in Portugal. The hospital, located in the central region of the country and the only pediatric hospital of reference for COVID-19 in that area, admits children under 18 years of age, mainly from the city but also from the district, provides tertiary services for the entire central region of the country, and serves a pediatric population of approximately 300 000 persons.

The municipality of Coimbra has no other 24-hour primary care service, and there are no other pediatric emergency services in the city or surrounding area (about 50 km). This multivalent emergency service looks after ambulatory pathologies (both medical and surgical), including short-stay admissions for up to 48 hours. There are approximately 62 000-65 000 admissions per year, some referred from other hospitals or general practitioners (around 10%). However, most are brought directly by the parents (more than 75%), of whom approximately 45% are below the age of 5 years, 55% given a level III priority and 35% a level II. The most frequent diagnoses are upper respiratory tract infections, acute gastroenteritis, and fever. Care is provided free of charge, and no referral is required.

This analysis included all pediatric patients (< 18 years) observed in the emergency service or admitted to the short stay unit, using International Classification of Diseases (ICD-9 and ICD-10) discharge codes for the following diagnoses: acute nasopharyngitis, acute tonsillitis and pharyngitis, acute otitis media, flu, pneumonia, acute bronchiolitis, cough, fever without a source and bacteremia, urinary tract infection, acute gastroenteritis, rash, chickenpox, cellulitis, and impetigo. The first year of the pandemic (from March 2020 to February 2021) was compared with the homologous periods from the previous two years (March 2018 to February 2019 and March 2019 to February 2020). Age, gender, date of observation and diagnosis were registered. Age was categorized into different age groups:

- Infants: 0-12 months;
- Preschool age: 1-4 years;
- School age: 5-9 years;
- Teenagers: 10-18 years.

Statistical analysis was performed on SPSS version 26 and Excel version 16.49, using a two-proportion z-test with Bonferroni correction. A value of  $p < 0.05$  was considered significant.

## Results

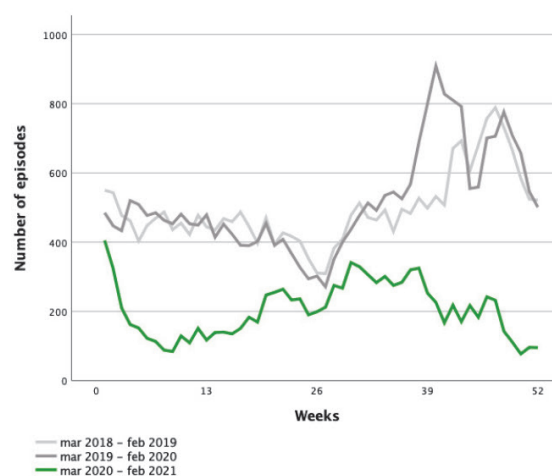
Out of a total of analyzed 63 458 episodes of infection-related admissions, 25 793 (40.7%), 26 918 (42.4%) and 10 747 (16.9%) were in 2018-2019, 2019-2020 and 2020-2021, respectively.

The median age and interquartile range in each period were 2 (1-6), 3 (1-6) and 2 (1-7) years, respectively, and the percentage of boys in each period was 52.7%, 52.6% and 52.4% respectively. The distribution by gender and age did not differ in the different periods.

In 2020-2021, there was a 60% decrease, compared to the previous periods. This reduction was more pronounced during the lockdown periods (61.2% and 66.1% during the first and second lockdown periods, respectively). Out of the lockdown periods, from May to November 2020, the reduction was 50.1%. The weekly variation in the number of episodes for each study period is presented in Fig. 1. The pre-pandemic periods have a similar distribution during the year, with a typical rise in the numbers during the winter months. This is in contrast with the pandemic at the first year that shows a completely different variation, as described above.

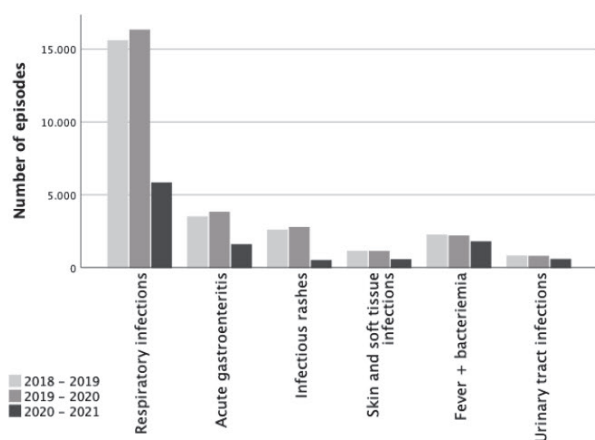
The major impact was observed in the respiratory infections group (Fig. 2, Table 1), presenting a 95% reduction for flu, 82% for acute bronchiolitis and 88% for pneumonia.

A marked decrease of episodes of gastrointestinal infections (60%), rash (80%), and chickenpox (86%) were also observed in this study. The reduction was less evident for urinary tract infections (30%) and fever without a source (20%). A similar analysis was performed considering the age variable categorized, which showed similar results between the two periods analyzed.



feb - February; mar - March.

**Figure 1.** Weekly admissions for infectious diseases in the emergency service and short stay unit in each of the three analyzed periods.



**Figure 2.** Number of admissions by diagnosis in the emergency service and short stay unit in each period.

**Table 1.** Comparison of infectious diseases between the average of the first two periods (2018-2019, 2019-2020) and the pandemic period (2020-2021)

Diagnosis	2018-2020	2020-2021	p value *
Acute nasopharyngitis	5648	2628	< 0.001
Acute tonsillitis and pharyngitis	4296	1632	0.096
Acute otitis media	2329	667	< 0.001
Flu	634	43	< 0.001
Pneumonia	1003	148	< 0.001
Acute bronchiolitis	1432	276	< 0.001
Cough	605	418	< 0.001
Acute gastroenteritis	3648	1572	< 0.001
Rash	2128	421	< 0.001
Chickenpox	543	72	< 0.001
Cellulitis + impetigo	1112	536	< 0.001
Fever + bacteriemia	2202	1768	< 0.001
Urinary tract infections	779	566	0.995

\* Two-proportion z-test with Bonferroni correction.

During the study period, there were 362 cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, corresponding to 3.7% of the total number of tests that were performed (n = 9802).

## Discussion

The present study demonstrates a dramatic decrease in the most frequent admissions related to infectious diseases in a pediatric emergency service during the first year of the pandemic. The biggest reduction was observed in the respiratory group, gastrointestinal infections, and rashes, all transmitted by particles and fecal-oral route.

Several explanations have been associated with these

major reductions.<sup>1,4-8</sup> Firstly, the non-pharmacological measures adopted during the pandemic, including mandatory lockdowns, the closure of schools and day-care centers, physical distancing, and hygienic measures. These are very likely to have contributed to decreasing the spread of some infections<sup>4</sup> and might explain the greater reductions during the two lockdowns.

Secondly, although children appear to have a more benign course, the fear of acquiring COVID-19 on hospital grounds may have affected the decision of parents to use the emergency service. Additionally, the respect for the limited human resources available may also have played an important role, leading the parents to adopt a watch and wait approach instead of immediately presenting to the emergency service. These observations seem to reinforce the importance of effective public health communication not only in fighting the spread of SARS-CoV-2 but also for other infections, and additionally, for better and more rational use of emergency services.

Interestingly, this reduction was not observed in the same way in all infectious diseases. Fever without a source and suspected bacteremia did have a less pronounced reduction. This might be due to the fact that when the reason for the complaints was not clear, because of the fear that it could be COVID-19, parents brought their children to the emergency service. This observation is consistent with the results of another publication.<sup>9</sup>

For urinary tract infections, there was not a major decrease in the number of episodes. This could be explained by the fact that its acquisition is not dependent on contact between children.

Although some of our findings have already been reported in other countries,<sup>4-10</sup> mainly focusing on respiratory diseases,<sup>11,12</sup> the strengths of this study are the sample size, the coverage of a long period, spanning lockdown and non-lockdown periods, and the inclusion of the most common infections in pediatrics, analyzing them separately.

Since a large proportion of antibiotic prescriptions for children is done in emergency service, it will be very interesting to analyze its use during this period, observe future trends, and evaluate the impact on resistance.

The results of our study confirm the marked decrease that occurred in infections observed in a pediatric emergency service, highlighting the role of non-medical interventions in the control of pediatric infectious diseases. This evidence can be the key to taking on some new routines in the day-to-day of the health services and of the community worldwide. However, some of these measures may have a very negative impact on the



well-being, mental health, as well as social development of children and adolescents.<sup>13</sup> A balance between the maintenance of a healthy social life adequate for all ages and mitigation of viral epidemics and their consequences needs to be found.

### Author Contributions

IT, MD and FR participated in the study conception or design. IT participated in acquisition of data. IT, MD, BO and FR participated in the analysis or interpretation of data. IT participated in the drafting of the manuscript. MD, BO and FR participated in the critical revision of the manuscript. All authors approved the final manuscript and are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

### Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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### Protection of human and animal subjects

The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki 2013).

### Provenance and peer review

Not commissioned; externally peer reviewed

### Confidentiality of data

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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## Que Impacto Teve a COVID-19 Noutras Doenças Infeciosas Pediátricas?

**Introdução:** A pandemia de doença do coronavírus 2019 (COVID-19) em Portugal forçou o governo português a decretar dois confinamentos durante o último ano, com implementação de diversas medidas não médicas rigorosas, causando um enorme impacto na utilização dos serviços de saúde.

**Métodos:** Os episódios de urgência por patologia infecciosa mais comum em idade pediátrica durante o primeiro ano de pandemia foram comparados com os dois anos anteriores.

**Resultados:** Observou-se uma redução de 60% no número total de episódios por patologia infecciosa mais comum, maioritariamente devido às infeções respiratórias e

gastrointestinais, principalmente durante os períodos de confinamento.

**Discussão:** Essa importante redução nos episódios de urgência por patologia infecciosa durante a pandemia reforça o papel das intervenções não farmacológicas na prevenção destas doenças e a importância de uma melhor e mais racional utilização dos serviços de urgência pediátrica.

**Palavras-Chave:** Adolescente; Controle de Doenças Transmissíveis; Criança; COVID-19; Hospitais Pediátricos; Lactente; Pandemias; Portugal; Serviço Hospitalar de Emergência; Transmissão de Doença Infecciosa

