Prevalence of SARS-CoV-2 positivity in infants with bronchiolitis: a multicentre international study

Giorgio Cozzi,[1] Luisa Cortellazzo Wiel ,[2,3] Alessandro Amaddeo ,[1] Antonio Gatto ,[4] Manuela Giangreco,[1] Adi Klein-Kremer,[5] Samantha Bosis,[6] Davide Silvagni,[7] Carla Debbia,[8] Laura Nanni,[9] Sara Chiappa,[10] Marta Minute,[11] Ilaria Corsini,[12] Giuliana Morabito,[13] Anna Jolanda Gortan,[14] Marco Colombo,[15] Federico Marchetti,[16] Davide Garelli,[17] Arianna Piffer,[18] Fabio Cardinale,[19] Nitai Levy ,[20] Antonietta Curatola,[21] Bojana Gojsina,[22,23] Suvradeep Basu,[3] Egidio Barbi,[1,2] Aleksandar Sovtic,[22,23] On behalf of the SARS-CoV-2 bronchiolitis study group

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For numbered affiliations see end of article.

Correspondence to
Dr Luisa Cortellazzo Wiel, University of Trieste, Trieste, Italy; luisacortellazzowiel@gmail.com

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ABSTRACT

Background Bronchiolitis is the leading acute respiratory tract infection in infants during the winter season. Since the beginning of the SARS-CoV-2 pandemic, a reduction in the number of bronchiolitis diagnoses has been registered.

Objective The present study aimed to describe the incidence and clinical features of bronchiolitis during the 2020–2021 winter season in a large cohort of children in Europe and Israel, and to clarify the role of SARS-CoV-2.

Setting, patients, interventions We conducted a multicentre observational cross-sectional study in 23 paediatric emergency departments in Europe and Israel. Clinical and demographic data about all the cases of infants diagnosed with bronchiolitis from 1 October 2020 to 30 April 2021 were collected. For each enrolled patient, diagnostic tests, treatments and outcomes were reported.

Main outcome measures The main outcome was the prevalence of SARS-CoV-2-positive bronchiolitis.

Results Three hundred and fourteen infants received a diagnosis of bronchiolitis during the study period. Among 535 infants who tested positive for SARS-CoV-2, 16 (3%) had bronchiolitis. Median age, male sex predominance, weight, history of prematurity and presence of comorbidities did not differ between the SARS-CoV-2-positive and SARS-CoV-2-negative groups. Rhinovirus was the most common involved pathogen, while respiratory syncytial virus (RSV) was detected in one case. SARS-CoV-2 bronchiolitis had a mild clinical course, with one patient receiving oxygen supplementation and none requiring paediatric or neonatal intensive care unit admission.

Conclusions During the SARS-CoV-2 pandemic, a marked decrease in the number of bronchiolitis diagnoses and the disappearance of the RSV winter epidemic were observed. SARS-CoV-2-related bronchiolitis was rare and mostly displayed a mild clinical course.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Bronchiolitis is the primary cause of infants' hospitalisation and death for a viral infection in Western countries.
⇒ While most cases are due to respiratory syncytial virus infections, other respiratory viruses, such as rhinovirus, adenovirus and coronavirus can be involved.
⇒ To date, no data are available on the prevalence of SARS-CoV-2-related bronchiolitis.

WHAT THIS STUDY ADDS

⇒ This multicentre international study shows that SARS-CoV-2 infection in infants is an uncommon cause of bronchiolitis.
⇒ SARS-CoV-2-related bronchiolitis mostly displays a mild clinical course, consistent with rhinovirus-sustained forms.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This multicentre international study provides important insights about the natural history of the SARS-CoV-2 infection in infants and the clinical course of SARS-CoV-2-related bronchiolitis.

INTRODUCTION

Bronchiolitis is the most common acute lower respiratory tract infection in infants[1] and the leading cause of hospitalisation and death for a viral infection in Western countries.[2] Clinical features include tachypnoea, nasal flaring, chest retractions, impaired nutrition and hydration and auscultatory wheeze and crackles. Most cases are due to respiratory syncytial virus (RSV) infections. Nevertheless, other respiratory viruses, such as rhinovirus, adenovirus and coronavirus can be responsible for the development of the disease. The management of bronchiolitis is mainly supportive, including oxygenation, ventilation, nutrition and hydration, as recommended by several international guidelines.[3–5]

Data on SARS-CoV-2 infection in the paediatric age suggest that, in most cases, children develop a milder disease compared with adults, with hospitalisation or admission to intensive care unit (ICU) being required in only a minority of cases.[6] To date,

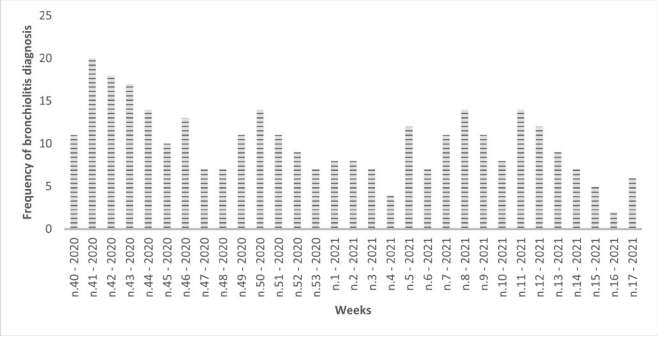

Figure 1 Distribution of the cases of bronchiolitis during the study period.

little data are available about the role of SARS-CoV-2 in the development of bronchiolitis in infants and newborns.[7 8]

The aim of this study was to assess the prevalence of bronchiolitis associated with SARS-CoV-2 infection during the 2020–2021 winter season, and to describe its clinical course in comparison to bronchiolitis related to other viruses.

METHODS

A multicentre international cross-sectional study was conducted, involving 23 centres, 15 from Italy, 4 from Switzerland, 2 from Israel, 1 from the UK and 1 from Serbia.

The enrolment took place from 1 October 2020 to 30 April 2021.

Eligible patients were infants diagnosed with bronchiolitis at the paediatric emergency department (PED).

Inclusion criteria were age from 0 to 12 months, clinical diagnosis of bronchiolitis following the current international guidelines[3–5] and the availability of a SARS-CoV-2 molecular test result. The disease diagnostic criteria include symptoms of upper respiratory tract infection (URTI), such as rhinorrhoea and cough, signs of respiratory distress (eg, high respiratory rate for age, use of an accessory respiratory muscle, intercostal retractions, nasal flaring, crackles or wheeze, low oxygen saturation levels, changes in skin colour), fever, exposure to subjects displaying symptoms consistent with URTI and the occurrence during the epidemic season.

Children who received a diagnosis of bronchiolitis but were older than 12 months of age were excluded from participation in the study. Patients already enrolled in the study were excluded from further participation if a second episode occurred.

Data were collected with a specific form (see online supplemental appendix) and reported in an electronic database through the Research Electronic Data Capture platform.

The following characteristics were recorded for each enrolled patient: age, sex, presence of comorbidities, diagnostic tests performed in the PED or during hospitalisation (blood tests, chest X-ray, nasal or pharyngeal swabs), use of respiratory support in the PED and during hospitalisation (oxygen supplementation, high flow nasal cannula (HFNC), continuous positive airway pressure (CPAP), non-invasive ventilation (NIV), intubation), admission status and length of hospitalisation. Moreover, every participating centre provided data regarding the overall number of attendances, the number of attending infants and the number of infants tested positive for SARS-CoV-2 at the PED during the study period. The total number of bronchiolitis diagnoses and attendances during the 2019–2020 and 2018–2019 was also collected. SARS-CoV-2 positivity was detected through a molecular test, performed through nasal or nasopharyngeal swab at the PED or during hospitalisation.

The primary study outcome was the prevalence of SARS-CoV-2 positivity among infants with bronchiolitis. The secondary outcome was the comparison of infants positive and negative for SARS-CoV-2 for the following variables: need for oxygen supplementation, NIV, intubation, feeding and hydration support, rate of hospitalisation, admission to ICU, length of hospital stay and death.

Statistical analysis

Assuming a prevalence of SARS-CoV-2-related bronchiolitis of 10% among infants attending the PED for bronchiolitis, with a precision of 5% and alpha=0.05, 139 subjects were needed to complete the study.

The characteristics of the study sample were synthesised with frequency and percentage for categorical variables and with median and IQR for continuous variables. The prevalence of SARS-CoV-2-related bronchiolitis was calculated as the ratio between the number of infants with bronchiolitis tested positive for SARS-CoV-2 attending the PED during the study period and the total number of infants with bronchiolitis attending the PED during the same time.

Differences between SARS-CoV-2-related bronchiolitis and bronchiolitis not related to SARS-CoV-2 were evaluated by the χ^2 test or the Fisher's exact test, when appropriate, for categorical variables and by the non-parametric Mann-Whitney U test for continuous variables. All analyses were conducted using SAS software, V.9.4 (SAS Institute, Cary, North Carolina, USA), and a p value <0.05 was considered statistically significant.

RESULTS

From October 2020 to April 2021, 224 119 children were evaluated at the PED of the participating centres. Among them, 19 087 were infants and 314 received a diagnosis of bronchiolitis. During the study period, 535 (3%) infants tested positive for SARS-CoV-2: among the latter, 16 (3%) received a diagnosis of bronchiolitis.

Figure 1 shows the distribution of the cases of bronchiolitis during the study period. Table 1 presents the flow of the number of attendances and diagnoses of bronchiolitis in the last three winter seasons in the participating centres. The number of PED

Table 1 Distribution of PED attendances and bronchiolitis diagnoses by period of evaluation

Period	Number of PED attendances	Percentage reduction of PED attendances compared with the previous year	Number of bronchiolitis diagnoses	Percentage reduction of bronchiolitis diagnoses compared with the previous year
1 October 2018–30 April 2019	376 229	–	4459	–
1 October 2019–30 April 2020	311 750	17%	3988	11%
1 October 2020–30 April 2021	224 199	28%	314	92%

PED, paediatric emergency department.

Table 2 Main demographical and clinical features of infants with bronchiolitis

	SARS-CoV-2-positive bronchiolitis (n=16)	SARS-CoV-2-negative bronchiolitis (n=298)	P value
Age in months, median (IQR)	4 (3–4)	5 (2–8)	0.18
Male sex, n (%)	11 (68.7)	193 (64.8)	0.75
Weight in kg, median (IQR)	6.2 (5–7.3)	6.5 (4.7–8.2)	0.40
History of prematurity, n (%)	2 (12.5)	47 (15.8)	1.0*
Presence of at least one comorbidity, n (%)	1 (6.3)	45 (15.1)	0.48*
Chronic pulmonary disease	1 (6.2)	18 (6.0)	1.0*
Congenital heart disease	0 (0.0)	17 (5.7)	1.0*
Genetic syndrome	0 (0.0)	11 (3.7)	1.0*
Other	0 (0.0)	22 (7.4)	0.61*
Positivity for at least one other virus, n (%)	1 (6.3)	40 (13.4)	0.62*
Rhinovirus	1 (6.3)	27 (9.0)	
Adenovirus	0	6 (2.0)	
Parainfluenza virus	0	4 (1.3)	
Coronavirus NL63	0	3 (1.0)	
Metapneumovirus	0	2 (0.7)	
Respiratory syncytial virus	0	1 (0.3)	
Bocavirus	0	1 (0.3)	
Enterovirus	0	3 (1.0)	
SARS-CoV-2-positive parents, n (%)			
Both parents	7 (43.8)	3 (1.0)	<0.0001*
Father	0 (0.0)	1 (0.3)	
Mother	3 (18.7)	5 (1.7)	

*Fisher's exact test.

Table 3 Diagnostics tests, treatments performed and outcomes of infants with bronchiolitis

	SARS-CoV-2-positive bronchiolitis (n=16)	SARS-CoV-2-negative bronchiolitis (n=298)	P value
Diagnostic tests, n (%)			
Blood tests	8 (50.0)	136 (45.6)	0.73
Chest X-ray	4 (25.0)	95 (31.9)	0.78*
Chest CT scan	0 (0.0)	2 (0.7)	1.0*
Treatment received, n (%)			
Hydration	2 (12.5)	63 (21.1)	0.54*
Oxygen supplementation	1 (6.3)	81 (27.2)	0.08*
Any non-invasive respiratory support	1 (6.3)	36 (12.1)	0.70*
HFNC	1 (6.3)	35 (11.7)	1.0*
CPAP	0 (0.0)	4 (1.3)	1.0*
NIV	0 (0.0)	1 (0.3)	1.0*
Mechanical ventilation, n (%)	0 (0.0)	0 (0.0)	–
Pharmacological therapies, n (%)			
Inhaled steroids	0 (0.0)	28 (9.4)	0.38*
Inhaled epinephrine	1 (6.3)	26 (8.7)	1.0*
Inhaled albuterol	3 (18.7)	135 (45.3)	0.04*
Inhaled hypertonic solution	0 (0.0)	25 (8.4)	0.63*
Systemic steroids	1 (6.3)	71 (23.8)	0.13*
Antibiotic	3 (18.7)	64 (21.5)	1.0*
Outcome, n (%)			
Discharge from the PED	4 (25.0)	147 (49.3)	0.07*
Short observation in the PED	4 (25.0)	57 (19.1)	0.53*
Admission to the paediatric ward	8 (50.0)	110 (36.9)	0.29
Admission to the NICU	0 (0.0)	4 (1.3)	1.0*
Admission to the PICU	0 (0.0)	16 (4.4)	1.0*
Death	0 (0.0)	0 (0.0)	–
Days of hospitalisation, median (IQR)	3 (2–4)	3 (2–5)	0.80

*Fisher's exact test.
CPAP, continuous positive airway pressure; HFNC, high flow nasal cannula; NICU, neonatal intensive care unit; NIV, non-invasive ventilation; PED, paediatric emergency department; PICU, paediatric intensive care unit.

attendances progressively declined. The diagnoses of bronchiolitis drastically dropped in the 2020–2021 winter season compared with the two previous ones. Table 2 describes the main demographical and clinical characteristics of the enrolled patients. Infants with bronchiolitis who tested positive for SARS-CoV-2 displayed clinical features consistent with those infants who tested negative for SARS-CoV-2. The median age was 4 months (IQR: 3–4) and 5 months (IQR: 2–8) in the SARS-CoV-2-positive and SARS-CoV-2-negative groups, respectively. Gender, weight, history of prematurity and presence of comorbidities did not differ between the two groups.

One patient affected by SARS-CoV-2 also proved positive for rhinovirus. Forty (13%) SARS-CoV-2-negative patients tested positive for other viruses, mostly rhinovirus and in one case RSV (table 2). Infants with SARS-CoV-2 positivity were more likely to have intrafamilial contact, with 10 (62.5%) having at least 1 parent positive for SARS-CoV-2. Nine infants (3.0%) in the SARS-CoV-2-negative group had a SARS-CoV-2 familial contact. Among these, three tested positive for other viruses, namely two for rhinovirus and one for rhinovirus and RSV.

Table 3 shows the diagnostic tests performed, the treatments received and the outcome of the population. Feeding support and hydration were provided to 2 (12.5%) infants positive for SARS-CoV-2 and 63 (21.1%) infants negative for SARS-CoV-2 (p=0.54). Oxygen supplementation was required by 1 (6.3%) patient in the SARS-CoV-2-positive group and 81 (27.2%) in the SARS-CoV-2-negative group (p=0.08). The same patient in the SARS-CoV-2-positive group received HFNC, whereas among the infants who tested negative for SARS-CoV-2, 35 (12%) received HFNC, 4 (1%) CPAP, 1 (0.3%) NIV.

None of the infants in the SARS-CoV-2-positive group required admission to neonatal ICU (NICU) or paediatric ICU (PICU), eight (50.0%) were admitted to the paediatric ward and four (25.0%) were discharged from the PED. Among these subjects, the length of hospitalisation was similar between patients who tested positive and negative for SARS-CoV-2 (p=0.8). No infants with a diagnosis of bronchiolitis died during the study period.

DISCUSSION

This large multicentre international study showed a low prevalence of SARS-CoV-2-related bronchiolitis, with only 16 (5%) out of 314 infants with bronchiolitis testing positive for SARS-CoV-2. Moreover, among 535 infants who tested positive for SARS-CoV-2, only 16 (3%) had a diagnosis of bronchiolitis.

SARS-CoV-2-related clinical pictures in adults range from URTI to severe pneumonia and acute respiratory distress syndrome, the latter constituting the leading cause of morbidity and mortality from SARS-CoV-2 worldwide.[9] Despite initial concerns, SARS-CoV-2 infection in children proved to have a mild course in most cases,[10–13] with only mild respiratory

symptoms.[14] To date, only few cases of SARS-CoV-2-related bronchiolitis have been described.[7 8 15] In this study, we reported the largest cohort of this disease, confirming the low prevalence of bronchiolitis in infants who tested positive for SARS-CoV-2. These data provide important highlights about the natural history of the SARS-CoV-2 infection in infants, which had been unknown so far.

Consistent with previous data, we found that the clinical characteristics of infants with bronchiolitis positive for SARS-CoV-2 did not differ from those negative for SARS-CoV-2. The median age was 4 months, there was a male sex predominance and 3 out of 16 infants had a history of prematurity. Only one patient had a pre-existing chronic pulmonary condition.

Our data showed a relatively mild course of SARS-CoV-2 bronchiolitis. No infants required NICU or PICU admission, half needed hospitalisation with only one patient requiring non-invasive respiratory support (HFNC). Only 2 patients (13%) in the SARS-CoV-2-positive group needed hydration compared with 63 (21%) in the SARS-CoV-2-negative group, and only 1 patient with SARS-CoV-2 bronchiolitis required oxygen supplementation. These data support the observation that SARS-CoV-2-related bronchiolitis has a relatively mild course. Only one child had a co-infection, testing positive for both SARS-CoV-2 and rhinovirus, without displaying a worse clinical course.

In accordance with previous data,[16 17] during the study period, a marked decrease in PED attendances was registered compared with the 2018–2019 (−40%) and 2019–2020 (−17%) winter season. Remarkably, the reduction of bronchiolitis diagnoses was even higher, with a 93% and 92% decrease in the 2020–2021 winter season compared with 2018–2019 and 2019–2020, respectively. These data confirm that the SARS-CoV-2 pandemic deeply impacted the epidemiology of respiratory infections in infants and children, as a result of the significant reduction of the circulation of viruses, and in particular of RSV.[18] Several factors can be involved in this epidemiological change: public health measures such as social distancing, travel restrictions, compulsory use of face masks and hand sanitisation, likely reduced exposure and suppressed interhuman transmission of SARS-CoV-2 and other viruses. Rhinovirus was the primary pathogen isolated in our series, as already reported in other studies performed during the SARS-CoV-2 pandemic.[19 20] The observed frequency of rhinovirus is consistent with the average circulation of the virus, which has its peak during early fall, and to a lesser extent, during spring.[21 22] It has been shown that while face masks can prevent transmission of human coronaviruses and influenza viruses, they do not reduce the transmission of droplets and aerosols containing rhinoviruses.[23] Moreover, rhinovirus persists up to 4 days on inanimate surfaces, is highly resistant to ethanol-based disinfectants[24] and reaches airways through contact with contaminated hands, on which it can persist for several hours.[25] More interestingly, we observed an almost complete absence of the RSV epidemic during the last winter in Europe and Israel, as already described in other continents.[26 27] This precluded the possibility to compare the clinical course of SARS-CoV2 bronchiolitis and RSV bronchiolitis.

Treatment of bronchiolitis is mainly supportive, and the current international guidelines recommend against the use of most pharmacological therapies[28]; however, we observed a high use of inhaled therapies (albuterol, epinephrine and hypertonic saline) and systemic steroids. Since it was beyond the scope of this study, we did not collect data about local practices and guidelines that may influence the choice of therapies. Nevertheless, in this series, infants with bronchiolitis tested positive for SARS-CoV-2 did not receive more diagnostic tests and pharmacological therapies compared with infants negative for SARS-CoV-2.

Interestingly, nine patients had a history of familial contact but tested negative for SARS-CoV-2. These patients might have been false negative for SARS-CoV-2 infection, but four of them had a rhinovirus infection and two had co-infection with enterovirus and RSV, which can explain their clinical presentation.

Our study has some limitations. First, we collected data from countries that applied different social distancing measures during the same period, thus potentially affecting the homogeneity of the results. However, we did not observe significant differences between the participating centres, neither in the reported prevalence of bronchiolitis nor in the total number of infants who tested positive for SARS-CoV-2. Second, the enrolment was limited to patients with bronchiolitis who underwent a SARS-CoV-2 test, and we were unable to assess the number of children, who, despite a clinical diagnosis of bronchiolitis, did not undergo this investigation. Nevertheless, during the study period, all infants attending the PED with respiratory symptoms were tested for SARS-CoV-2 infection, in all the participating centres except one: in the latter, the swab was performed in all infants with bronchiolitis requiring hospital observation or admission. While reporting a low prevalence of bronchiolitis during the winter season, we could have missed a delayed spread of bronchiolitis, as already reported in Australia and France,[29 30] as our data have been collected until April 2021. However, we did not observe a late raise in the number of bronchiolitis diagnoses in the last weeks of the study period. Virus detection through nasal and nasopharyngeal swabs was performed according to local practice and no common diagnostic panel was used. Thus, the exact prevalence of the different viruses may have been influenced by the sensitivity of the tests used. SARS-CoV-2-related bronchiolitis was rare, and results about the clinical course of these patients were difficult to generalise. Nevertheless, the low number of SARS-CoV-2 bronchiolitis in our cohort of >500 infants (only 3% of infants with a SARS-CoV-2 positivity) demonstrated that pulmonary involvement in infants was rare and not as severe as initially expected. Finally, the design of this study did not include a follow-up of the enrolled infants with bronchiolitis, so we were unable to assess the occurrence of further respiratory symptoms in patients with SARS-CoV-2-related bronchiolitis compared with patients with RSV or rhinovirus infections. Future studies should address this issue.

In conclusion, in this large multicentre study, analysing >19 000 infants attending the PED, we observed a low prevalence of bronchiolitis during the 2020–2021 winter season. Only 16 out of 314 infants with bronchiolitis tested positive for SARS-CoV-2, and only 3% of infants positive for SARS-CoV-2 developed bronchiolitis. Moreover, SARS-CoV-2-related bronchiolitis had a mild clinical course compared with seasonal viral bronchiolitis. Rhinovirus was the most common pathogen, while RSV was detected only in one case. Following the identification of new variants, including Omicron, in addition to the easing of restrictions, there has been a raise in the number of infants and children testing positive for SARS-CoV-2. In addition, a delayed epidemic of bronchiolitis has already been reported.[29 31] Further studies are needed to compare the results of the current study with the subsequent seasons and continuous surveillance remains mandatory.

Author affiliations
[1]IRCCS Materno Infantile Burlo Garofolo, Trieste, Italy
[2]University of Trieste, Trieste, Italy
[3]Bradford Royal Infirmary, Bradford, UK

[4]Policlinico Universitario Agostino Gemelli, Roma, Italy
[5]Hillel Yaffe Medical Center, Hadera, Israel
[6]Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy
[7]Azienda Ospedaliera Universitaria Integrata Verona, Verona, Italy
[8]Istituto Giannina Gaslini Istituto Pediatrico di Ricovero e Cura a Carattere Scientifico, Genova, Italy
[9]Azienda Ospedaliero Universitaria Meyer, Firenze, Italy
[10]Ospedale dei Bambini di Brescia, Brescia, Italy
[11]Ospedale Regionale Ca Foncello Treviso, Treviso, Italy
[12]University Hospital of Bologna Sant'Orsola-Malpighi Polyclinic, Bologna, Italy
[13]Ospedale Santa Maria degli Angeli di Pordenone, Pordenone, Italy
[14]Azienda sanitaria universitaria Friuli Centrale, Udine, Italy
[15]ASST Sette Laghi, Varese, Italy
[16]Ospedale Santa Maria delle Croci, Ravenna, Italy
[17]Regina Margherita Children's Hospital, Turin, Italy
[18]Regional Hospital of Bellinzona and Valli, Bellinzona, Switzerland
[19]Ospedale Pediatrico Giovanni XXIII, Bari, Italy
[20]Ruth Rappaport Children's Hospital, Haifa, Israel
[21]Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Roma, Italy
[22]Institute for Health Protection of Mother and Child of Serbia 'Dr Vukan Cupic', Beograd, Serbia
[23]University of Belgrade Faculty of Medicine, Beograd, Serbia

Twitter Laura Nanni @Lanannidoc

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Collaborators Itai Shavit, Pediatric Emergency Department, Ruth Rappaport Children's Hospital, Rambam Health Care Campus, Haifa, Israel. Federica Vanoni, Clinic of Pediatrics, Pediatric Institute of Southern Switzerland, EOC, Bellinzona, Switzerland. Alessandra Iacono, Department of Pediatrics, Santa Maria delle Croci Hospital, Ravenna, Italy. Stefano Masi, Pronto Soccorso Pediatrico, Azienda Ospedaliero Universitaria Meyer, Firenze. Emanuela Piccotti, Pronto Soccorso Pediatrico, IRCCS pediatrico Gaslini, Genova. Anna Maria Plebani, Pronto Soccorso Pediatrico, Ospedale Filippo del Ponte, ASST Sette Laghi, Varese, Italy. Valentina Tranchino, Department of Pediatrics and Emergency, Pediatric Hospital Giovanni XXIII, Bari, University of Bari, Italy. Gregorio Paolo Milani, Pediatric Unit, Fondazione IRCCS Ca' Granda-Ospedale Maggiore Policlinico, Milano, Lombardia, Italy; Department of Clinical Science and Community Health, Università degli Studi di Milano, Milan, Lombardia, Italy. Sara Pedicini, Clinica Pediatrica, Azienda Sanitaria Universitaria Integrata Friuli Centrale (ASUFC). Vered Nir, Hillel Yaffe Medical Center, Haifa, Israel. Jelena Visekruna, Mother and Child Health Institute of Serbia and School of Medicine University of Belgrade.

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ORCID iDs
Luisa Cortellazzo Wiel http://orcid.org/0000-0003-0069-560X
Alessandro Amaddeo http://orcid.org/0000-0003-2117-0781
Antonio Gatto http://orcid.org/0000-0002-8778-9328
Nitai Levy http://orcid.org/0000-0003-2476-9204

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Data collection form for the project entitled: 'Prevalence of SARS-CoV-2 positivity in infants with bronchiolitis'

Thank you for your participation in the project entitled: 'Prevalence of SARS-CoV-2 positivity in infants with bronchiolitis'. Please complete the data collection form created for the project, after checking the inclusion and exclusion criteria.

Should you encounter any problem with the completion of the questionnaire, please contact Dr. Giangreco Manuela at manuela.giangreco@burlo.trieste.it

Thank you for your cooperation.

id paziente	_____
Age range: 0 - 12 month	◯ Yes ◯ No (Check for inclusion criteria)
Clinical Diagnosis of bronchiolitis (viral infection - onset with rhinorrhea and/or upper respiratory tract infections followed by respiratory distress associated with: crackles and/or wheezing, use of accessory muscles or lower chest wall retractions, low O2 saturation levels, high respiratory rate relative to age, skin color changes, nasal flaring, fever)	◯ Yes ◯ No (Check for inclusion criteria)
Patient already enrolled in the study	◯ Yes ◯ No (Check for absence of exclusion criteria)
Enrollment center	_____ (All in lower case with consistent wording)
Date of access to the Pediatric Emergency Department (ED)	_____ (enter the date in DD/MM/YYYY (day, month and year) format)
Age	_____ (in months)
Sex	◯ M ◯ F
Weight	_____ (in kg, decimal separator is period)

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Ethnicity	◯ caucasian ◯ african ◯ asian ◯ other
Specify ethnicity	_____ (All in lower case with consistent wording; if possible, do not indicate country of birth or citizenship)
Prematurity: birth before 37 gestational weeks	◯ Yes ◯ No

Comorbidities

Presence of comorbidities	◯ Yes ◯ No
Comorbidity: congenital heart disease	◯ Yes ◯ No
Comorbidity: chronic pulmonary disease	◯ Yes ◯ No
Comorbidity: genetic or malformation syndrome	◯ Yes ◯ No
Specify genetic or malformation syndrome	_____ (All in lower case. List all syndromes, separated by commas if more than one)
Comorbidity: Other comorbidity	◯ Yes ◯ No
Specify other comorbidity	_____ (All in lower case. List all comorbidities, separated by commas if more than one)

COVID-19 (SARS-CoV-2) positivity

COVID-19 (SARS-CoV-2) positivity	◯ Yes ◯ No
Were any COVID-19 (SARS-CoV-2) diagnostic tests performed?	◯ Yes ◯ No
What type of diagnostic COVID-19 (SARS-CoV-2) tests were performed?	☐ Pharyngeal or nasal swabs, antigenic test ☐ Pharyngeal or nasal swabs, molecular test ☐ Other

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Specify other types of diagnostic COVID-19 (SARS-CoV-2) test performed	_____ (All in lower case. List all tests, separated by commas if more than one)
COVID-19 (SARS-CoV-2) positivity in parents	◯ Yes ◯ No
Which parent was COVID-19 (SARS-CoV-2) positive?	◯ mother ◯ father ◯ both parents
What type of diagnostic COVID-19 (SARS-CoV-2) tests were performed in parents?	☐ Pharyngeal or nasal swabs, antigenic test ☐ Pharyngeal or nasal swabs, molecular test ☐ Other
Specify other types of diagnostic COVID-19 (SARS-CoV-2) test performed in parents	_____ (All in lower case. List all tests, separated by commas if more than one)

Diagnostic procedure in the Pediatric ED or during hospitalization

Diagnostic procedure: Blood test	◯ Yes ◯ No
Diagnostic procedure: Chest x-ray	◯ Yes ◯ No
Diagnostic procedure: Chest TC scan	◯ Yes ◯ No
Diagnostic procedure: Serological test for other viruses	◯ Yes ◯ No
Specify positivity to other viruses from serological tests	_____ (All in lower case. List all positive viruses, separated by commas if more than one)
Diagnostic procedure: Molecular tests for other viruses	◯ Yes ◯ No
Specify positivity to other viruses from molecular tests	_____ (All in lower case. List all positive viruses, separated by commas if more than one)
Diagnostic procedure: Other procedures performed	◯ Yes ◯ No

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Specify which other diagnostic procedures were performed	_____ (All in lower case. Specify all procedures, separated by commas if more than one)

Medical therapies in the Pediatric ED or during hospitalization

Medical therapy: Hydration / nutritional support (intravenous or feeding tube)	◯ Yes ◯ No
Medical therapy: Oxygen supplementation	◯ Yes ◯ No
Medical therapy: Non-invasive ventilatory support	◯ Yes ◯ No
Which Non-invasive ventilatory support: HFNC (High Flow Nasal Cannula)	◯ Yes ◯ No
Which Non-invasive ventilatory support: C-PAP (Continuous Positive Airway Pressure)	◯ Yes ◯ No
Which Non-invasive ventilatory support: NIV (Non-Invasive Ventilation)	◯ Yes ◯ No
Medical therapy: Mechanical ventilation	◯ Yes ◯ No
Medical therapy: Antibiotic drug	◯ Yes ◯ No
Medical therapy: Salbutamol	◯ Yes ◯ No
Medical therapy: Inhaled corticosteroid drug	◯ Yes ◯ No
Medical therapy: Systemic corticosteroid drug	◯ Yes ◯ No
Medical therapy: Hypertonic solution	◯ Yes ◯ No
Medical therapy: Inhaled adrenaline	◯ Yes ◯ No
Medical therapy: Other drugs	◯ Yes ◯ No
Specify other drugs administered	_____ (All in lower case. Specify all drugs, separated by commas if more than one)

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Outcome - Admission status	
Admission status: Discharge	◯ Yes ◯ No
Admission status: Short-Stay Observation (SSO) in the Pediatric ED	◯ Yes ◯ No
Admission status: Admission to the pediatric ward	◯ Yes ◯ No
Admission status: Admission to neonatal intensive care unit	◯ Yes ◯ No
Admission status: Admission to intensive care unit	◯ Yes ◯ No
Admission status: Transferred to another Hospital	◯ Yes ◯ No
Admission status: Other admission status/outcome	◯ Yes ◯ No
Specify other admission status/outcome	_____ (All in lower case)
Length of hospitalization	_____ (in numbers)

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Short questionnaire for the enrollment center partecipating to the project entitled 'Prevalence of SARS-CoV-2 positivity in infants with bronchiolitis'

Thank you for your participation in the project entitled: 'Prevalence of SARS-CoV-2 positivity in infants with bronchiolitis'. Please complete the short questionnaire on your enrollment center

Should you encounter any problem with the completion of the questionnaire, please contact Dr. Giangreco Manuela at manuela.giangreco@burlo.trieste.it

Thank you for your cooperation.

1)	Name, Surname and full affiliation of the research center contact person	_____ (All in lower case and separated by commas)
2)	Enrollment center	_____ (All in lower case with consistent wording)
3)	Number of visits in the Pediatric ED (Emergency Department) during the study period (1 October 2020 - 30 April 2021)	_____ (in numbers)
4)	Number of visits in the Pediatric ED in the period 1 October 2018 - 30 April 2019	_____ (in numbers)
5)	Number of visits in the Pediatric ED in the period 1 October 2019 - 30 April 2020	_____ (in numbers)
6)	Number of episodes of bronchiolitis in the period 1 October 2018 - 30 April 2019	_____ (in numbers)
7)	Number of episodes of bronchiolitis in the period 1 October 2019 - 30 April 2020	_____ (in numbers)
8)	Number of visits in the Pediatric ED of children aged < 1 year during the study period (1 October 2020 - 30 April 2021)	_____ (in numbers)
9)	Number of visits in the Pediatric ED of children aged < 1 year and COVID-19 (SARS-CoV-2) positive during the study period (1 October 2020 - 30 April 2021)	_____ (in numbers)