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Screening and Severity of Coronavirus Disease 2019 (COVID-19) in Children in Madrid, Spain

As the pandemic of coronavirus disease 2019 (COVID-19) spreads, new data emerge and understanding of the disease improves. Reports associated with children are growing but still scarce.[1-3] The epicenter of the epidemic has displaced to Europe. The first case in Spain was declared on January 31, 2020, and the first case in the Madrid region was declared on February 27, 2020.

Methods | With the aim of obtaining an overview of the proportion of confirmed cases among those tested and the severity of the disease in children, a registry of tested cases was performed from March 2, 2020, to March 16, 2020, by pediatricians in 30 secondary and tertiary hospitals in Madrid, Spain, during the first 2 weeks of the epidemic. Children were screened according to Spanish Public Health recommendations, which included those patients with a significant disease who were admitted, or likely to be admitted, at the time of evaluation according to the attending pediatrician or patients with signs or symptoms compatible with COVID-19 and the risk of complications due to baseline disease. This study was approved by the ethics committee of Hospital 12 de Octubre. Data collection was allowed by verbal consent with subsequent written consent provided by patients with positive results. Data were deidentified. The test used for diagnosis was real-time polymerase chain reaction.[4] The reported sensitivities for the E gene and RdRp gene assays are 5.2 and 3.8 copies per reaction at 95% detection probability, respectively.[4] Both genes needed to be amplified to report a positive result.

Results | During the first 2 weeks of the epidemic in Madrid, Spain, 365 children were screened within the 30 hospitals. During the first week, 6 of 103 patients (5.8%) had positive test results. At the end of the second week, 41 of 365 patients (11.2%) had positive test results (**Table**). By March 16, 2020, 41 of the 4695 confirmed cases (0.8%) in Madrid region were children younger than 18 years.

The median age of the tested patients was 3 years (interquartile range, 0.9-6 years; range, 0-15 years) and the median age of the patients with positive results was 1 year (interquartile range, 0.35-8.5 years; range 0-15 years). Twenty five of 41 children with confirmed COVID-19 (60%) were hospitalized, 4 of 41 (9.7%) were admitted to a pediatric intensive care unit (PICU), and 4 of 41 (9.7%) needed respiratory support beyond nasal prongs (Table). Of these, 1 of 4 (25%) had only 1 previous condition (recurrent wheezing). No patients died. Initial syndromic diagnoses were

Table. Clinical Features of Participants Tested for Severe Acute Respiratory Syndrome Coronavirus 2

Features	No. (%)		*P* value[a]
	Positive (n = 41)	Negative (n = 324)	
Sex			
Female	23 (56)	134 (41.3)	.35
Male	18 (44)	143 (44.1)	
NA	0	47 (14.5)	
Contact with person with confirmed case			
Yes	16 (39)	49 (15.1)	<.001
No/community transmission	25 (61)	275 (84.8)	
Hospitalization			
Yes	25 (60)	218 (68)	.41
No	16 (40)	106 (32)	
PICU admission			
Yes	4 (10)	18 (5.5)	.28
No	37 (90)	306 (94.4)	
Respiratory support beyond oxygen in nasal prongs			
Yes	4 (10)	7 (2.1)	<.001
No	37 (90)	317 (97.8)	
High-flow ventilation	1 (2)	6 (1.8)	
Noninvasive ventilation	2 (5)	0	
Mechanical ventilation	1 (2)	1 (0.3)	
Underlying disease			
Yes	11 (27)	50 (15.4)	.06
No	30 (73)	274 (84.5)	

Abbreviations: NA, data not available; PICU, pediatric intensive care unit.

[a] The *P* value was calculated as χ^2 with Fisher correction as needed.

upper respiratory tract infection (14 [34%]), fever without a source (11 [27%]), viral-like pneumonia (6 [15%]), bronchiolitis (5 [12%]), gastroenteritis or vomiting (2 [5%]), bacterial-like pneumonia (2 [5%]), and asthma flare (1 [2%]). Two patients (5%) had a coinfection with influenza B.

Discussion | Our series agrees with those previously published, suggesting that only 2% of affected individuals are younger than 19 years.[1] In Madrid, 60% of confirmed infections in children required admission. The usual criteria for admission in our region because of respiratory problems coincide with the definition of severe disease in China. Only 21 of 731 children with confirmed COVID-19 (2.8%) in China had severe disease (hypoxia and oxygen saturation less than 92%) or critical disease.[5]

The key issue regarding the high percentage of admissions is the number of children tested. Initially, only children with contact with a person with COVID-19 were tested, but the situation changed rapidly. From March 9, 2020, onwards, Madrid was declared an area of community transmission. Afterwards, the recommendation was to test only hospitalized children with symptoms and signs of COVID-19 or patients with comorbidities and a high risk of complications. Some children at risk of hospitalization were also tested, although they were ultimately discharged. In other settings, several children with mild disease were tested and the proportion of admissions was lower.[1] Therefore, testing may have been biased to moderate to severe patients, and results must be interpreted with caution. Other reasons for the different proportion of hospitalizations, PICU admissions, and respiratory support may be associated with an increased awareness of COVID-19, different criteria for hospitalization and initiation of high-flow oxygen therapy, or different host responses to the infection.

Limitations. One limitation of this study is the sensitivity of the test. Some authors state that pharyngeal and nasal swab sensitivity is as low as 32% to 63%.[6] Although the sensitivity and specificity of the polymerase chain reaction may have improved, the actual number of children with infection may be higher.

Conclusions | Infections in children occur early in COVID-19 epidemics. The proportion of confirmed patients among those with compatible symptoms was 11%. Severe infections may occur, needing PICU admission or high-flow ventilation. Further information is warranted to shape the features of this disease in children.

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Accepted for Publication: March 30, 2020.

Published Online: April 8, 2020. doi:10.1001/jamapediatrics.2020.1346

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Correction: This article was corrected on May 11, 2020, to fix errors in the Table.

Author Contributions: Dr Tagarro had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Tagarro, Moraleda, Calvo.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Tagarro, Moraleda, Calvo.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Tagarro.
Administrative, technical, or material support: Epalza, Moraleda.
Supervision: Tagarro, Epalza, Sanz-Santaeufemia, Moraleda, Calvo.

Conflict of Interest Disclosures: Dr Epalza reported consulting fees from Viiv and a scientific travel grant from Gilead outside the submitted work. No other disclosures were reported.

Additional Contributions: We thank all the patients and families for their participation in this cohort and the staff members who cared for them at their personal risk in this time of this epidemic. We also thank the pediatricians who cared for the patients and gathered data from them, who included Rut del Valle (Hospital Infanta Sofia), Sara Villanueva (Hospital 12 de Octubre), María Penin (Hospital Príncipe de Asturias), María de Ceano (Hospital La Paz), María José Pérez (Hospital Puerta de Hierro), Elvira Cobo (Hospital Fundación Alcorcón) Mariam Tovizi (Hospital del Tajo), Pilar Galán (Hospital Fundación Fuenlabrada), Beatriz Soto (Hospital de Getafe), Adriana Navas (Hospital Infanta Leonor) M. Luz García (Hospital de Leganés), Marta Llorente (Hospital del Sureste), Sara Pérez (Hospital de Torrejón), Lucía Figueroa (Hospital de Villalba), Amanda Bermejo (Hospital de Móstoles), Gema Sabrido (Hospital Rey Juan Carlos) María José Hernández (Hospital Central de la Defensa), Ana Belén Jiménez (Fundación Jiménez Díaz), Arantxa Berzosa (Hospital Clínico San Carlos), Carmen Arquero (Universidad Europea) Julia Jensen (Hospital Infanta Cristina), Paula Vidal (Hospital Infanta Elena), Sara Domínguez (Fundación Hospital 12 de Octubre), Angustias Ocaña (Hospital La Moraleja) Isabel Romero (Hospitales Madrid), and M.J. Pascual (Hospital Nisa). None of these individuals received compensation for their contributions.

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