

## LETTER TO THE EDITOR

# COVID-19 among children with cancer in Greece (2020): Results from the Nationwide Registry of Childhood Hematological Malignancies and Solid Tumors (NARECHEM-ST)

To the Editor:

The impact of coronavirus disease 2019 (COVID-19) varies by age and chronic disease group. Children are generally at low risk for serious complications<sup>1</sup>; children with cancer (CwC), however, are vulnerable to infections mainly due to immunosuppression caused by treatment.<sup>2</sup> We aimed to assess the magnitude and severity of COVID-19 among CwC in Greece.

An electronic survey entailing demographic characteristics, cancer type, COVID-19 infection, treatment, and outcome information among CwC diagnosed at ages 0–14 years (January 1, 2010 to December 31, 2020) and alive until December 31, 2020 was electronically addressed (November 2020) to members of treating groups and complementary sources collaborating with the Nationwide Registry of Childhood

Hematological Malignancies and Solid Tumors (NARECHEM-ST) and to referral centers of pediatric clinics for severe COVID-19 cases representing all seven medical schools across the country. Active contact of treating CwC personnel with families allows follow-up after completion of hospital treatment and accurate assessment of mortality ([www.narechem.gr](http://www.narechem.gr)). The deadline for monitoring COVID cases was December 31, 2020.

Over 2200 cases of pediatric cancer (leukemias, lymphomas, CNS, liver, and kidney tumors, neuroblastomas, and sarcomas) are alive among those registered in NARECHEM-ST (2010–2019 and preliminary 2020 data); about 420 of them live in Northern Greece. No COVID-19 cases were reported during the first 8 months of 2020.<sup>3</sup> During the last 4 months however, among the prevalent CwC cases,

**TABLE 1** Demographic and clinical characteristics of children with cancer diagnosed with SARS-CoV-2 infection in Greece ( $n = 15$ )

N	Sex	Age (years) at COVID-19 diagnosis	Age (years) at cancer diagnosis	Type of cancer	Treatment for cancer or F/U	COVID-19 symptoms at diagnosis	Source of infection	Cancer treatment modification	Hospitalization for COVID-19	Antimicrobials
1	M	14.1	12.5	HL	F/U	Fever	Family	N/A	No	AZ
2	F	5.9	0.7	CNS-T	M/A	Tracing	Parents	Withheld	No	AZ
3	F	8.8	7.5	ALL	MT	Tracing	Parents	Withheld	No	AZ
4	M	9.8	7.9	ALL	MT	Sore throat	Parents	Withheld	No	-
5	M	5.6	3.9	ALL	MT	Tracing	Parents	Withheld	No	-
6	F	15.2	14.4	OS	RT	Fever	Sibling	Withheld	No	-
7	M	14.4	12.7	NHL	F/U	Fever	Family	N/A	No	-
8	F	10.5	8.5	NHL	MT	Fever	Father	Withheld	No	-
9	M	14.3	9.3	HL	F/U	Fever	Family	N/A	No	-
10	M	5.9	3.9	ALL	MT	Tracing	Family	Withheld	No	-
11	F	18.6	12.9	ALL	F/U	Tracing	Family	N/A	No	-
12	F	5.7	3.3	ALL	F/U	Fever	Grandfather	N/A	No	-
13	M	17.3	0.4	NB	F/U	Anosmia	Family	N/A	No	-
14	F	9.4	7.7	CNS-T	F/U	Fever	Aunt	N/A	No	-
15	F	4.9	4.3	ALL	A/R <30 days	Fever	Unknown	N/A	Yes (4 days)	Pip-Taz

Abbreviations: ALL, acute lymphoblastic leukemia; A/R, after reinduction; AZ, azithromycin; CNS-T, central nervous system tumor; F/U, follow up; HL, Hodgkins lymphoma; M/A, monoclonal antibody; MT, maintenance; N/A, not applicable; NB, neuroblastoma; NHL, non-Hodgkins lymphoma; OS, osteosarcoma; Pip-Taz, piperacillin-tazobactam; RT, radiotherapy.

15 were reported with SARS-CoV-2 (median age: 9.8 years, range 4.9–18.6; seven of 15 boys), 12 living in Northern Greece (Table 1). NARECHEM-ST data show that although the overall estimated COVID-19 infection rate (6.5/1000 CwC) in Greece during 2020 was low, the infection rate among CwC in Northern Greece was over four times higher (28.5/1000 CwC), reflecting the much heavier disease burden experienced by that region during the second wave of the pandemic in 2020, especially during the months of October to December.


Cancer types included 11 hematological malignancies, notably seven acute lymphoblastic leukemias (ALL) plus four lymphomas, and an extra four solid tumors. Four children with ALL were receiving maintenance treatment, which was interrupted for 2 weeks. Interruption/short delay of treatment was also reported in one patient with NHL, a second one with low-grade glioma and a third one with osteosarcoma. Within 30 days prior to COVID-19, five patients with ALL, one with NHL and one with osteosarcoma had received chemotherapy, whereas another with CNS tumor had received monoclonal antibody. Seven were childhood cancer survivors (lymphoma  $N = 3$ , ALL  $N = 2$ , neuroblastoma  $N = 1$ , CNS tumor  $N = 1$ ). An additional COVID-19 case was identified while being investigated for a brain tumor diagnosis; the parents opted for treatment abroad, hence, the child could not be included in this analysis. Household contact was the source of COVID-19 infection in 14 cases, with fever prevailing (8/10) among patients presenting with symptoms. Of note, the course of COVID-19 infection was mild and self-limited. However, antimicrobials were administered in three children by the primary care physician (azithromycin) and in one child who was hospitalized piperacillin tazobactam, because of fever with neutropenia. Eventually, no adverse outcome was detected in this case series on reports of parents to treating physicians.

In line with other reports, CwC in Greece are at lower risk and severity in COVID-19 compared to adults.<sup>4–6</sup> Data from a nationwide study during the first epidemic wave indicated that most pediatric cases in the general population were also associated with topical outbreaks, reflecting regional patterns of disease among adults.<sup>6</sup> Despite presenting as sporadic events during the late 2020 period, COVID-19 occurrence among CwC in our country developed following exposure to a close family contact or family clustering of cases, as also indicated elsewhere.<sup>7</sup> Notwithstanding the staggering toll of COVID-19 on the health and survival of multitudes of people, pediatric cancer remains the primary disease-related cause of mortality; in the current era, pediatric oncology care remains a challenge aiming at securing the future for this vulnerable population due to indirect effects of the pandemic.

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Margarita Baka<sup>1,2</sup>  
 Athanasios Michos<sup>3</sup>   
 A. Alexopoulou<sup>4</sup>  
 P. Bouka<sup>1</sup>  
 E. Bouka<sup>1</sup>  
 E. Dana<sup>5</sup>  
 G. Dimitriou<sup>6</sup>  
 Doganis<sup>2</sup>  
 I. Grivea<sup>7</sup>  
 M. Ioannidou<sup>8</sup>  
 M. Kourti<sup>9</sup>  
 E. Magkou<sup>2</sup>  
 A. Makis<sup>10</sup>  
 A. Malama<sup>11</sup>  
 E. Mantadakis<sup>12</sup>  
 G. Markozannes<sup>13</sup>  
 A. Mitsios<sup>14</sup>  
 M. Moschovi<sup>15</sup>  
 V. Papadakis<sup>1</sup>  
 P. Panagopoulou<sup>16</sup>  
 E. Papakonstantinou<sup>9</sup>  
 S. Papadopoulos<sup>17</sup>  
 S. Polychronopoulou<sup>18</sup>  
 M. Themistocleous<sup>14,19</sup>  
 V. Tzotzola<sup>18</sup>  
 Evangelia Ntzani<sup>1,13,20</sup>  
 Eleni Th Petridou<sup>1,21</sup> 

<sup>1</sup> Hellenic Society for Social Pediatrics and Health Promotion, Athens, Greece

<sup>2</sup> Department of Pediatric Hematology-Oncology, P&A Kyriakou Children's Hospital, Athens, Greece

- <sup>3</sup> Division of Infectious Diseases, First Department of Pediatrics, "Aghia Sophia" Children's Hospital, Medical School, National and Kapodistrian University of Athens, Athens, Greece
- <sup>4</sup> Children's & Adolescents' Radiotherapy Department, P&A Kyriakou Children's Hospital Athens, Greece
- <sup>5</sup> Children and Adolescents' Hematology-Oncology Department, 'Mitera' Children's Hospital, Athens, Greece
- <sup>6</sup> Department of Pediatrics, Medical School, University of Patras, Rio Achaia, Greece
- <sup>7</sup> Department of Pediatrics, University General Hospital, Medical School University of Thessaly, Larissa, Greece
- <sup>8</sup> Hematology-Oncology Unit, 2nd Pediatric Department, Aristotle University of Thessaloniki, AHEPA Hospital, Thessaloniki
- <sup>9</sup> Department of Pediatric Oncology, Hippokration General Hospital, Thessaloniki, Greece
- <sup>10</sup> Pediatric Hematology-Thalassemia Unit, Department of Pediatrics, Faculty of Medicine, School of Health Sciences, University of Ioannina, Ioannina, Greece
- <sup>11</sup> Department of Imaging, A Sofia Children's Hospital, National and Kapodistrian University of Athens, Athens, Greece
- <sup>12</sup> Hematology-Oncology Unit, Department of Pediatrics, University General Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Thrace, Greece
- <sup>13</sup> Department of Hygiene and Epidemiology, School of Medicine, University of Ioannina, Ioannina, Greece
- <sup>14</sup> Department of Neurosurgery, A. Sofia Children's Hospital, Athens, Greece
- <sup>15</sup> Pediatric Hematology-Oncology Unit, First Department of Pediatrics, A. Sofia Children's Hospital, Medical School, National and Kapodistrian University of Athens, Athens, Greece
- <sup>16</sup> 4th Department of Pediatrics, Aristotle University of Thessaloniki, Greece
- <sup>17</sup> Department of Pathology, "Hygeia" General Hospital of Athens, Athens, Greece
- <sup>18</sup> Dept of Pediatric Hematology-Oncology, A. Sofia Children's Hospital, Athens, Greece
- <sup>19</sup> Secretary General, Primary Health Care, Ministry of Health, Athens, Greece
- <sup>20</sup> Center for Evidence Synthesis in Health, Department of Health Services, Policy and Practice, School of Public Health, Brown University, Providence, Rhode Island, USA
- <sup>21</sup> Department of Epidemiology, Hygiene and Medical Statistics, National and Kapodistrian University of Athens, Athens, Greece

## Correspondence

Petridou Th E, Department of Epidemiology, Hygiene and Medical Statistics, National and Kapodistrian University of Athens, Athens, Greece.

Email: [epetrid@med.uoa.gr](mailto:epetrid@med.uoa.gr)

M. Baka, A. Michos, and NARECHEM-ST Collaborating Group contributed equally to this study.

NARECHEM-ST Collaborating Group: Alexopoulou A1, Bouka P2, Bouka E2, Dana E3, Dimitriou G4, Doganis5, Grivea I6, Ioannidou M7, Kourti M8, Magkou E5, Makis A9, Malama A10, Mantadakis E11, Markozannes G12, Mitsios A13, Moschovi M14, Papadakis V2, Panagopoulou P15, Papakonstantinou E8, Papadopoulos S16, Polychronopoulou S17, Themistocleous M13,18, Tzotzola V17

## ORCID

Athanasios Michos  <https://orcid.org/0000-0003-1745-1118>

Eleni Th Petridou  <https://orcid.org/0000-0003-3695-3439>

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.