



# Out-of-hospital deaths among children during COVID-19 pandemic: indicator of collateral damage?

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## ABSTRACT

We aimed to investigate the out-of-hospital mortality, and the actual prevalence of COVID-19 in children requiring paediatric emergency department (ED) care for infectious symptoms. There were four emergency medical services (EMS) responses concerning children (age 0–15 years) leading to death on-scene in 2 months during the pandemic, and eight during the previous 12 months in the Helsinki University Hospital area, although the number of EMS missions decreased by 18%. The prevalence of COVID-19 in children contacting a paediatric ED for any infectious symptoms during the epidemic peak was only 2.7%.

The infection control measures during the COVID-19 pandemic have inevitably had effects on children and their welfare. As COVID-19 is mainly mild in children<sup>1–3</sup>, they may not benefit from the infection control measures; thus, there is an increasing concern about causing collateral damage to children.<sup>4</sup>

A decrease in paediatric emergency department (ED) visits during the pandemic<sup>5</sup> has raised a concern that parental worries over visiting healthcare could lead to delayed diagnosis of serious illness in children. Concurrently, the continuous presence of COVID-19 in media may create an illusion of a high prevalence of serious COVID-19 infections among children. Thus, diagnosis and treatment of common infections causing greater morbidity may also be delayed if healthcare professionals prioritise excluding COVID-19.

The aims of this study were to investigate the out-of-hospital mortality, and the actual prevalence of COVID-19 in children requiring ED care for infectious symptoms.

In March 2020 the Helsinki University Hospital (HUH) area (1 263 000 inhabitants) formed an epidemic hotspot, and the government launched social distancing measures. Schools, preschools and most after-school activities were closed, social gatherings were limited and Southern Finland was isolated

from the other parts of Finland. Health authorities recommended avoiding unnecessary ED contacts to prevent crowding of EDs and to limit transmission of SARS-CoV-2.

All out-of-hospital emergencies in the area are responded to by HUH emergency medical services (EMS). Advanced life support resuscitation is conducted on-scene, and, if unresponsive to resuscitation attempts, the patient is declared dead on-scene.

To investigate the out-of-hospital mortality, we retrieved all paediatric (age 0–15 years) EMS responses leading to on-scene death in the HUH area from 1 March 2020 to 30 April 2020, and during the previous 12 months from 1 March 2019 to 29 February 2020 from the electronic patient record system (Merlot Medi, CGI Suomi Oy). In order to assess the prevalence of COVID-19 in acutely ill children during the local epidemic peak, we searched all 113 children contacting one of the two paediatric EDs of HUH for any infectious symptoms from 8 April to 15 April 2020.

The institutional research committee approved the study protocol (S24/2020). There was no patient and public involvement.

There were four out-of-hospital deaths in 2 months in 2020 compared with eight in the preceding 12 months (*table 1*). All were separate incidents. Three (2.7%) of the 113 children contacting the paediatric EDs for infectious symptoms were positive for SARS-CoV-2 RNA.

The prevalence of COVID-19 in children requiring ED care for infectious symptoms was low, but the number of sudden out-of-hospital deaths was noticeable. These findings do not justify advising families with acutely ill children to avoid paediatric ED contacts in order to prevent transmission of SARS-CoV-2.

Sudden out-of-hospital deaths in children are extremely rare, and thus it is difficult to find statistically significant differences for short periods. We find the increase in out-of-hospital deaths noteworthy, especially during



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**Table 1** Characteristics of the EMS contacts with children (age 0–15 years) leading to on-scene death during the local peak of the pandemic (1 March 2020 to 30 April 2020) and the previous 12 months (1 March 2019 to 29 February 2020)

	1 March 2020 to 30 April 2020	1 March 2019 to 29 February 2020
All EMS contacts with children	912	6673
EMS contacts leading to death on-scene	4 (0.44%)	8 (0.12%)
Age (median, IQR)	3.5 (1.75–7.5)	2 (0–7)
Traumatic aetiology	3 (75%)	3 (38%)
Unresponsive and not breathing on arrival of EMS	4 (100%)	8 (100%)
Previous medical history with comorbidities	1 (25%) Mild 1 Severe 0	2 (25%) Mild 0 Severe 2

EMS, emergency medical services.

a period when children were less exposed to for example, traffic hazards following social distancing measures. In addition, the overall number of EMS contacts with children decreased by 18.0% compared with the previous 12 months. These findings may suggest that the concern about seriously ill children presenting late during the pandemic is justifiable. Unfortunately, we cannot give detailed information about the causes of deaths, as the children could be identifiable.

Both our cohorts were small but regionally inclusive. As paediatric mortality or intensive care admissions due to COVID-19 have not been reported in Finland,<sup>6</sup> we feel that the increase in sudden paediatric out-of-hospital deaths deserves further attention, and there is a need for more studies on the effects of the control measures on the health and welfare of children.

**Contributors** HH-R, HS, JO and MiK and MaK designed the study. Data collection was performed by JO, LP and HH-R. Data interpretation was performed by HH-R, HS, LP and MaK. The initial version of the manuscript was drafted by HH-R, HS and LP. All authors revised, edited and contributed substantially to the critical revision of the manuscript. All authors read and approved the final manuscript.

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