

IMPACT OF COVID-19 ON PEDIATRIC OUT-OF-HOSPITAL CARDIAC ARREST IN THE MASOVIAN REGION

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To the Editor,
 the epidemiology of pediatric out-of-hospital cardiac arrest (OHCA) is reasonably well described [1–6], with annual occurrence rates estimated at 7–8 per 100 000 children [7], although extensive variation exists, ranging from 2.28 to 18.0 per 100 000 person-years [5, 8–12], depending on the location and timing of the study. Data on pediatric OHCA during COVID-19 pandemic are very limited. Our purpose was to examine the changes in the characteristics and survival outcomes of pediatric OHCA following the COVID-19 outbreak in the Masovian region (Poland).

We conducted a retrospective cohort study from a National Emergency Medical Service Command Support System which is a prospective registry of medical interventions performed by emergency medical services (EMS) in Poland [13]. Our study was conducted according to the STROBE (strengthening the reporting of observational studies in epidemiology) guidelines [14] and complies with the Declaration of Helsinki. The study protocol was approved by the Institutional Review Board of the Polish Society of Disaster Medicine (approval no. 01.03.21.IRB).

All eligible consecutive pediatric patients suffering an OHCA from March 1 to December 30 in the years 2019 (pre-pandemic period) and 2020 (pandemic period), were enrolled. Children eligible for inclusion were > 48 hours and < 18 years of age and suffered an OHCA with pediatric advanced life support implementation by EMS teams. Subjects were excluded if the information on gender or cardiopulmonary resuscitation outcomes was missing. The pediatric population count was based on the Polish Central Statistical Office report for the year 2019. The outcomes included before-and-after comparative analyses focusing on the COVID-19 outbreak period and the analogous period in 2019. Statistical analysis was performed using STATA version 16.1EN (StataCorp LLC, Texas, USA).

There were 1 091 319 children living in the analyzed region in 2019. Since data for 2020 were not available, it was assumed there was no substantial change in the population during the study period. Overall, a total of 47 pediatric OHCA patients were included in this analysis [mean age 6.1 (6.3) years, 59.6% males; 18 in pre-COVID-19 and 29 in the

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Variable	Pre-COVID-19 (2019)	COVID-19 (2020)	Difference (95%CI)*	p-value
n	18	29		0.10
n per 100.000	1.65	2.66		0.10
Males (%)	13 (72.2%)	15 (51.7%)	-0.22 (-0.49, 0.05)	0.11
Age, years (SD)	5.1 (6.5)	6.7 (6.2)	1.60 (-2.16, 5.36)	0.40
EMS arrival time, min (SD)	11.2 ± 5.4	9.9 ± 4.2	-1.30 (-4.23, 1.63)	0.38
OHCA cause				
Medical	17 (94.4%)	24 (82.8%)	0.56 (0.10, 3.26)	0.52
Trauma	1 (5.6%)	5 (17.2%)	3.75 (0.40, 34.96)	0.25
Presenting rhythm, n (%)				
Shockable	1 (5.6%)	1 (3.4%)	0.64 (0.04, 10.94)	0.76
Not shockable	17 (94.4%)	28 (96.6%)	1.65 (0.10, 28.09)	0.73
Adrenaline administered, n (%)	8 (42.1%)	14 (48.3%)	1.17 (0.36, 3.80)	0.80
Atropine administered, n (%)	2 (11.1%)	3 (10.3%)	0.92 (0.14, 6.14)	0.93
Amiodarone administered, n (%)	0 (0.0%)	2 (6.9%)	3.36 (0.15, 74.15)	0.44
Airway management, n (%)				
Supraglottic airway device	8 (44.4%)	6 (20.7%)	0.33 (0.09, 1.19)	0.09
Endotracheal tube	4 (22.2%)	16 (55.2%)	4.31 (1.14, 16.30)	0.03
Intraosseous access, n (%)	7 (38.9%)	1 (3.4%)	0.06 (0.01, 0.51)	0.01
Outcome, n (%)				
Death in the field	6 (33.3%)	10 (34.5%)	1.05 (0.30, 3.65)	0.94
Transported with ongoing CPR	5 (27.8%)	13 (44.8%)	2.11 (0.60, 7.48)	0.25
Transported with ROSC	8 (44.4%)	6 (20.7%)	0.33 (0.09, 1.19)	0.09

CI — confidence interval; CPR — cardiopulmonary resuscitation; EMS — emergency medical service; OHCA — out-of-hospital cardiac arrest; ROSC — return of spontaneous circulation; SD — standard deviation

*Differences are expressed as rate difference or mean difference and 95% confidence intervals.

COVID-19 periods]. Patient characteristics, OHCA cause, and the presenting rhythm (either unshockable or not) were similar in the pre-COVID-19 and COVID-19 periods (Tab. 1). Time to EMS arrival and EMS interventions were similar with regard to the medical therapy administered (the rates of adrenaline, atropine, and amiodarone administered). However, children with OHCA in the COVID-19 period more often received an endotracheal tube compared to the pre-COVID-19 period ($p = 0.03$), although the use of a supraglottic airway device did not change. The use of intraosseous access decreased during the COVID-19 period ($p = 0.01$). The outcomes were similar in the categories of 'death in the field', 'transported with ongoing CPR', and 'transported with ROSC', although numerically more patients were transported with ongoing CPR, and much fewer did not have ROSC.

To conclude, we found no significant changes regarding outcomes, demographics, and field resuscitation rates, although we did find a marked increase in the rate of endotracheal tube intubation. Our findings may be due to the overall poor outcomes that

occur with pediatric OHCA or relatively small sample size, but we did not observe a negative 'COVID-19 effect' on outcomes in pediatric OHCA. Of note, the number of pediatric OHCA was higher during COVID-19 period, with a marked increase in traumatic OHCA. While this may not be a direct effect of COVID-19 infection in the pediatric population, it may be related to limited access to healthcare, increased psychosocial stress, and exposure to domestic violence. Although the number of cases of traumatic OHCA is limited, the relative rise in cases over a year is further investigation. A similar analysis in other regions and countries will distinguish between an alarming trend and an anomalous data point.

As a retrospective evaluation of the previously collected data, our paper is limited to hypothesis generation. Further, as pediatric OHCA is a relatively uncommon event, our sample size is small which limits our conclusions. Finally, because no COVID-19 testing results were recorded, we cannot confirm if any of the cases of OHCA were related to COVID-19.

Altogether, pediatric OHCA in the Masovian region is not common and has a poor prognosis.

The COVID-19 pandemic may have increased the number of OHCA, but has not changed the patient characteristics, presenting rhythm, or outcomes. Larger studies are needed to elucidate the trends noted here.

Conflict of interest

All authors declare no conflict of interest.

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