Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Letter to the Editor

Out-of-hospital cardiac arrest during the COVID-19 pandemic in the Province of Padua, Northeast Italy

To the Editor,

Authors from Lombardy, Italy,[1] and Paris, France[2] have recently reported an increase in the incidence of out-of-hospital cardiac arrest (OHCA), suggesting a direct or indirect effect of COVID-19. As hypothesized,[3] fewer patients received bystander-initiated cardiopulmonary resuscitation (CPR), and emergency medical services (EMS) arrival time and mortality were higher in both studies. In contrast, OHCA incidence and bystander-CPR in King County, USA remained similar to that of previous years.[4] Accordingly, we decided to investigate whether these worrying observations were present in OHCAs occurring in the Province of Padua. Of note, Padua is the most populated and densely inhabited province of Veneto Region, northeast of Italy (2142 km^2, 936,274 inhabitants) and, together with Lombardy, was the first area to have an outbreak of COVID-19 outside China. Between 21st February and 30th April 2020, a total of 17,960 COVID-19 cases were reported in the Veneto region.

Using retrospective data from the EMS database, we compared OHCAs occurred between 1st March and 30th April 2020 and the same period in 2019 (Table 1). During the active COVID-19 period, the EMS dispatch centre responsible for the study area had a 18% increase in daily calls (525 ± 97 vs 446 ± 44; $P < 0.001$) and a 7% increase in daily ambulances missions (240 ± 27 vs 225 ± 18; $P < 0.001$). During this period, EMS responded to a total of 200 OHCAs, consistent with the 206 OHCAs in the same period in 2019 and with characteristics of patients that did not differ substantially. We observed a numerical reduction in bystander-witnessed cases (13/52 [25%] vs. 17/59 [29%]; $P = 0.65$) and bystander-CPR rate (10/55 [18%] vs. 15/60 [25%]; $P = 0.38$). The median time between the call and EMS arrival was 1.2 min longer in 2020 than in 2019. When we break down the total arrival time in its main components (call to dispatch, dispatch to departure, and departure to arrival), we found that the culprit interval was the time between the call and EMS departure. In particular, a delay was seen during call taking and dispatch (2.4 [1.7–3.1] vs 2.0 [1.6–2.8]; $P = 0.002$) and between dispatch and departure (3.9 [2.5–6.0] vs 3.5 [2.4–4.6]; $P = 0.003$). The increase in the call taking and dispatch process can be explained by the need to ask questions about COVID-19 status (tested positive or COVID-like symptoms), and the increased dispatchers' workload (+17% of calls received). Instead, the delay in ambulances departure is mainly explained by the time needed to wear personal protective equipment. Also, ambulance sanitization and the moderate increase (+7%) in ambulance missions might account for departures delays. Interestingly, the time between EMS departure and arrival (i.e., road travel time) was significantly reduced (7.3 min [5.4–11] vs. 8.3 min [5.7–12]; $P = 0.04$), likely related to the 80% reduction in road traffic in the area[5] due to lockdown (8th March–18th May 2020). Of note, resuscitation manoeuvres were less attempted by EMS (45/114 [39%] vs. 48/90 [53%]; $P = 0.048$) in the COVID-19 period, fear of infection might have contributed to this variation. Rates of ROSC, transport with ongoing CPR, and out-of-hospital death remained similar in the two periods.

Compared with findings from Lombardy[1] and Paris,[2] we did not observe an increase in OHCA incidence and mortality, in line with what reported in Seattle and King County, USA.[4] Instead, a delay in EMS arrival and a numerical reduction in bystander-CPR rate was observed. Further research is needed to clarify the direct and indirect effects of COVID-19 on OHCA, with particular attention to regional variations.

Table 1 – Characteristics of OHCAs and EMS system between 1st March and 30th April 2020 and the same period in 2019.

	2020 (March 1−April 30)	2019 (March 1−April 30)	*P* value
Total number of calls received, n	32,047	27,193	/
Calls received per day, mean (SD)	525 (97)	446 (44)	<0.001
Emergency missions, n	14,629	13,714	/
Emergency missions per day, mean (SD)	240 (27)	225 (18)	<0.001
Total OHCA cases, n	**200**	**206**	/
Age, mean (SD)	79 (17)	77 (14)	0.23
Male sex, n (%)	89/175 (51%)	98/179 (55%)	0.46
Aetiology, n (%)			
Medical, n (%)	175/197 (89%)	179/204 (88%)	0.73
Trauma, n (%)	15/197 (7.6%)	17/204 (8.3%)	0.79
Drowning, n (%)	1/197 (0.5%)	0/204 (0%)	0.31
Overdose, n (%)	0/197 (0%)	1/204 (0.5%)	0.32
Electrocution, n (%)	0/197 (0%)	0/204 (0%)	/
Asphyxia, n (%)	6/197 (3.0%)	7/204 (3.4%)	0.83
Bystander witnessed, n (%)	13/52 (25%)	17/59 (29%)	0.65
Bystander CPR, n (%)	10/55 (18%)	15/60 (25%)	0.38
Minutes between call and EMS arrival, median (IQR)	16 (12−22)	15 (11−19)	0.01
Minutes between call and departure, median (IQR)	6.1 (4.8−8.7)	6.0 (4.6−7.2)	0.04
Minutes between call and dispatch, median (IQR)	2.4 (1.7−3.1)	2.0 (1.6−2.8)	0.002
Minutes between dispatch and departure, median (IQR)	3.9 (2.5−6.0)	3.5 (2.4−4.6)	0.003
Minutes between EMS departure and arrival, median (IQR)	7.3 (5.4−11)	8.3 (5.7−12)	0.04
Resuscitation attempted by EMS, n (%)	45/114 (39%)	48/90 (53%)	0.048
Outcomes among EMS treated OHCAs			
ROSC, n (%)	2/45 (4.4%)	4/48 (8.3%)	0.45
Transported with ongoing CPR, n (%)	4/45 (8.9%)	2/48 (4.2%)	0.35
Out-of-hospital mortality, n (%)	39/45 (87%)	42/48 (87%)	0.90
Outcomes among all OHCAs			
ROSC, n (%)	2/200 (1.0%)	4/206 (1.9%)	0.43
Transported with ongoing CPR, n (%)	4/200 (2.0%)	2/206 (1.0%)	0.39
Out-of-hospital mortality, n (%)	194/200 (97%)	200/206 (97%)	0.96

Categorical variables are reported as number and percentage, and the continuous variables are presented as mean and standard deviation (SD) or as median and interquartile range (IQR). Continuous variables were compared with Student's *t*-test or the Mann−Whitney test, and categorical variables using the χ^2 test. Statistical analysis was performed with Stata software (version 13, StataCorp, College Station, TX, USA). Percentages may not total 100 because of rounding.
CPR: cardiopulmonary resuscitation, EMS: emergency medical service, OHCA: out-of-hospital cardiac arrest, ROSC: return of spontaneous circulation.

Conflicts of interest

All authors do not have conflict of interest to declare.

Acknowledgements

We thank all the doctors, nurses, ambulance drivers, and volunteers working in the EMS system of the Province of Padua for their strong work during the COVID-19 pandemic.

REFERENCES

1. Baldi E, Sechi GM, Mare C, et al. Out-of-hospital cardiac arrest during the Covid-19 outbreak in Italy. N Engl J Med 2020 NEJMc2010418.
Marijon E, Karam N, Jost D, et al. Out-of-hospital cardiac arrest during the COVID-19 pandemic in Paris, France: a population-based, observational study. Lancet Public Health 2020; S2468266720301171.
3. Scquizzato T, Olasveengen TM, Ristagno G, Semeraro F. The other side of novel coronavirus outbreak: fear of performing cardiopulmonary resuscitation. Resuscitation 2020;150:92−3, doi:http://dx.doi.org/10.1016/j.resuscitation.2020.03.019.
4. Sayre MR, Barnard LM, Counts CR, et al. Prevalence of COVID-19 in out-of-hospital cardiac arrest: implications for bystander CPR [published online ahead of print, 2020 Jun 4].. Circulation 2020, doi: http://dx.doi.org/10.1161/CIRCULATIONAHA.120.048951.
5. COVID-19 - Mobility Trends Reports − Apple. (Accessed 16 June 2020, at https://www.apple.com/covid19/mobility/).

Andrea Paoli*
Centrale Operativa Servizio Urgenza Emergenza Medica - SUEM 118, Azienda Ospedaliera di Padova, Padova, Italy

Laura Brischigliaro
Università degli Studi di Padova, Scuola di Medicina e Chirurgia, Padova, Italy

Tommaso Scquizzato[a,b]
[a]*Department of Anesthesia and Intensive Care, IRCCS San Raffaele Scientific Institute, Milan, Italy*

[b]*Faculty of Medicine, Vita-Salute San Raffaele University, Milan, Italy*

Andrea Favaretto
Andrea Spagna
Centrale Operativa Servizio Urgenza Emergenza Medica - SUEM 118, Azienda Ospedaliera di Padova, Padova, Italy

* Corresponding author at: Centrale Operativa SUEM 118, Azienda Ospedaliera di Padova, Via Alvise Cornaro, 4, 35128 Padova, PD, Italy.
E-mail address: andrea.paoli@aopd.veneto.it (A. Paoli).

http://dx.doi.org/10.1016/j.resuscitation.2020.06.031