

LETTER TO THE EDITOR

Letter by Manfredini et al Regarding Article, “Ambulance Density and Outcomes After Out-of-Hospital Cardiac Arrest: Insights From the Paris Sudden Death Expertise Center Registry”

To the Editor:

We read with interest the article by Chocron and the Paris Sudden Death Expertise Center Investigators in a recent issue of *Circulation*,¹ reporting that, in a large sample of cases of out-of-hospital cardiac arrests, a higher density of ambulances providing basic and advanced life support was associated with successful return of spontaneous circulation. The authors concluded that improving healthcare organization could help to attenuate disparities in prognosis. Time is a crucial matter for emergency, both for organization and outcomes. It is well known that acute cardiac emergencies peak in the morning, and we have previously shown that a circadian variation is also present for emergency calls. In the past, we reviewed ≈21 000 emergency calls addressed along 1 calendar year to the Emergency Coordinating Unit (phone number: 113, equivalent for 911 in the United States) of the hospital of the town of Ferrara, Italy (150 000 inhabitants).² There was a peak frequency of calls in the morning hours for cardiological diseases, and for respiratory and neurological ones, as well. We suggested that the organization of the quantity and quality of emergency department staff could consider the increased demand of specific facilities during certain hours of the day. Some years earlier, Fromm et al³ reported that cardiac-related requests for helicopter transport also exhibited a significant morning frequency, from 6:00 AM to 12:00 noon, and this striking circadian variation was not observed in noncardiac patients. The time of onset of cardiac diseases is also important for outcome. A retrospective review of 5-year cardiac arrest data from a large, urban emergency medical services system in the United States reported better outcomes for cases occurring during the daytime than during nighttime.⁴ In fact, even after adjustment for a series of variables, including demographics, presenting rhythm, field termination, duration of call, dispatch-to-scene interval, automated external defibrillator application, bystander cardiopulmonary resuscitation, and location, the 30-day survival rate remained significantly higher after daytime out-of-hospital cardiac arrests in comparison with at night, with a relative risk of 1.10. In a previous population-based 4-year retrospective study conducted in the United Kingdom on all witnessed cardiac arrests attended by the Nottinghamshire Ambulance Service, the circadian variation of those who presented with ventricular fibrillation was significantly different from those presenting with a rhythm other than ventricular fibrillation, but was similar to the circadian variation of bystander cardiopulmonary resuscitation and survivors.⁵ Moreover, ambulance response time was also found to have a circadian variation, and the authors concluded that the circadian variation of ventricular fibrillation, and consequently survival, may be affected by the availability of bystander cardiopulmonary resuscitation and the speed of ambulance response. More than 356 000 out-of-hospital cardiac arrests and ≈790 000 myocardial infarctions occur each year in the United States. Not only how many ambulances,

Roberto Manfredini, MD,
PhD
Rosaria Cappadona, DNSc
Fabio Fabbian, MD

but also when they are more likely to be engaged and available, could make the difference. Taking into account differences by time for onset of cardiovascular events and rescue service response could have potential positive implications both for strategies of prevention and outcome optimization.

ARTICLE INFORMATION

Affiliation

Faculty of Medicine, Pharmacy and Prevention, University of Ferrara, Italy.

Disclosures

This article is supported, in part, by a scientific grant by the University of Ferrara (Fondo Ateneo Ricerca –FAR–, year 2018, prof. Roberto Manfredini).

REFERENCES

1. Chocron R, Loeb T, Lamhaut L, Jost D, Adnet F, Lecarpentier E, Bougouin W, Beganton F, Juvin P, Marijon E, et al; Paris SDEC Investigators. Ambulance density and outcomes after out-of-hospital cardiac arrest: insights from the Paris Sudden Death Expertise Center Registry. *Circulation*. 2019;139:1262–1271. doi: 10.1161/CIRCULATIONAHA.118.035113
2. Manfredini R, La Cecilia O, Boari B, Steliu J, Michelini V, Carli P, Zanotti C, Bigoni M, Gallerani M. Circadian pattern of emergency calls: implications for ED organization. *Am J Emerg Med*. 2002; 20:282–286.
3. Fromm RE Jr, Levine RL, Pepe PE. Circadian variation in the time of request for helicopter transport of cardiac patients. *Ann Emerg Med*. 1992;21:1196–1199. doi: 10.1016/s0196-0644(05)81745-7
4. Wallace SK, Abella BS, Shofer FS, Leary M, Agarwal AK, Mechem CC, Gaieski DF, Becker LB, Neumar RW, Band RA. Effect of time of day on pre-hospital care and outcomes after out-of-hospital cardiac arrest. *Circulation*. 2013;127:1591–1596. doi: 10.1161/CIRCULATIONAHA.113.002058
5. Soo LH, Gray D, Young T, Hampton JR. Circadian variation in witnessed out of hospital cardiac arrest. *Heart*. 2000;84:370–376. doi: 10.1136/heart.84.4.370