Resuscitation 166 (2021) 41–42

Available online at ScienceDirect

Resuscitation

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

Letter to the Editor

A quantitative assessment of the contribution of "citizen First Responder" in the adult out-of-hospital chain of survival during COVID-19 pandemic

To the Editor,

A decrease in out-of-hospital cardiac arrest (OHCA) bystander response was observed worldwide during the COVID-19 pandemic.[1] Therefore, the importance of first responders (FRs) in initiating cardiopulmonary resuscitation (CPR) and automatic external defibrillator (AED) use has increased. FRs are police officers, firefighters (named as "professional FRs"), or off-duty medical personnel and trained laypersons (named "citizen FRs"); they are alerted if a patient experiences OHCA within close vicinity.[2] During pandemic, scientific societies stressed the importance of donning personal protective equipment (PPE) before intervening[3]; furthermore some FRs system were temporarily suspended or limited to "professional FRs".[2] Also in Swiss Canton Ticino only the activation "professional FRs" activity was maintained. This situation provides the unique opportunity to quantitatively assess the contribution of "citizen FRs" in OHCA resuscitation including AED use before EMS arrival.

Using data from a prospective Utstein-based registry,[4,5] we compared the clinical characteristics and key resuscitation parameters of OHCAs occurred when the "citizen FRs" activation was halted (03/03/2020–26/06/2020; COVID-period) to those OHCAs occurring during the three months immediately after (27/06/2020–30/09/2020; Post-COVID period), and finally to those occurring in an historical period before COVID-19 pandemic (03/03–26/06 of years 2016–2019; Historical periods).

The OHCAs characteristics are presented in Table 1. The FRs system's activation remained unchanged during the COVID-period (73%) compared to post-COVID (81%, $p = 0.28$) or to the historical period (61%, $p = 0.051$). A trend toward longer FR arrival time was observed in COVID-period compared to historical period. A net reduction in CPR initiated by FRs before EMS arrival was observed during the COVID-period compared to the post-COVID ($p < 0.01$) and to the historical period ($p = 0.02$). These results remained unchanged even after considering OHCAs in whom a CPR was started by EMS. There was no significant reduction in AED use before EMS arrival in the COVID-period compared to historical period, both when considering all the confirmed OHCAs (16% vs 24%, $p = 0.09$) and those in whom a CPR was then initiated by EMS (20% vs 28%, $p = 0.15$).

For the first time, the contribution of "citizen FRs" in OHCA management has been quantified. During COVID-19 pandemic, when only "professional FRs" system was maintained, we noticed a significant decrease in the CPR initiated by FRs before EMS arrival and an increase in FR arrival time despite an unchanged activation of the FR system. The increase in FR arrival time is an indirect indicator (and measurement) of temporary removal of the "citizen FRs" from the chain-of-survival; however, also the time needed to wear PPE could have played a role. We observed that the AED use before EMS arrival during the pandemic was numerically lower but statistically not significant. This contrasts other studies which reported a net reduction in AED use.[1] A possible reason for this could reside that in our region AED is most frequently deployed by "professional FRs" rather than by "citizens FR". This highlights the advantage of a three-tier system composed by "professional FRs", "citizen FRs" and ambulance.

Summarizing, "citizen FRs" represent an important element in OHCA management accounting for about 15% of CPR initiated before EMS arrival.

Funding

The present study received no funding. Dr Baldi's salary was partially funded by grant 733381 from the European Union Horizon 2020 Research and Innovation Program of ESCAPE-NET.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Table 1 – Characteristics of the population. Pearson's Chi-squared test with continuity correction was used for categorical variable, whilst Kruskal-Wallis rank sum test for continuous variables as they were non-normally distributed.

Variable	COVID-period (n = 113)	Post-COVID period (n = 90)	Historical period (n = 398)	p-value
Age, years (median, IQR)	74 [61–82]	74 [57–81]	74 [60–83]	0.77
Male, n (%)	80 (70.8)	65 (72.2)	256 (64.3)	0.21
CPR initiated by EMS, n (%)	91 (80.5)	59 (65.6)	307 (77.1)	0.13
Medical etiology, n (%)	96 (85)	71 (78.9)	324 (81.4)	0.07
Witnessed, n (%)				0.06
No	47 (41.6)	49 (54.4)	150 (37.7)	
Yes, by bystander	54 (47.8)	31 (34.4)	200 (50.2)	
Yes, by EMS	12 (10.6)	10 (11.1)	48 (12.1)	
Bystander CPR, n (%)	59 (82)	32 (73)	207 (68)	0.06
FRs system activated, n (%)	64 (73)	53 (81)	217 (61)	<0.01
FR arrival time, mins (median, IQR)	8.5 [5–9.2]	8 [7–10]	6 [4.5–8.4]	<0.01
CPR initiated by FRs, n (%)	29 (45.3)	39 (73.6)	135 (62.2)	<0.01
AED used before EMS, n (%)	18 (15.9)	20 (22.2)	95 (23.9)	0.2

Legend: Cardiopulmonary Resuscitation (CPR), Emergency Medical System (EMS), First Responder (FR).

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;383:496–8. https://doi.org/10.1056/NEJMc2010418.
2. Andelius L, Oving I, Folke F, et al. Management of first responder programmes for out-of-hospital cardiac arrest during the COVID-19 pandemic in Europe. Resusc Plus 2021;5:100075. https://doi.org/10.1016/j.resplu.2020.100075.
3. Edelson DP, Sasson C, Chan PS, et al. Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates with Suspected or Confirmed COVID-19: From the Emergency Cardiovascular Care Committee and Get with the Guidelines-Resuscitation Adult and Pediatric Task Forces of the. *Circulation* 2020;141. https://doi.org/10.1161/CIRCULATIONAHA.120.047463.
4. Mauri R, Burkart R, Benvenuti C, et al. Better management of out-of-hospital cardiac arrest increases survival rate and improves neurological outcome in the Swiss Canton Ticino. Europace 2016;18:398–404. https://doi.org/10.1093/europace/euv218.
5. Baldi E, Auricchio A, Klersy C, et al. Out-of-hospital cardiac arrests and mortality in Swiss Cantons with high and low COVID-19 incidence: A nationwide analysis. Resusc Plus 2021;6:100105. https://doi.org/10.1016/j.resplu.2021.100105.

Enrico Baldi [1]

Fondazione Ticino Cuore, Breganzona, Switzerland

Cardiocentro Ticino Institute, Ente Ospedaliero Cantonale, Lugano, Switzerland

Department of Molecular Medicine, Section of Cardiology, University of Pavia, Pavia, Italy

Cardiac Intensive Care Unit, Arrhythmia and Electrophysiology and Experimental Cardiology, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy

Maria Luce Caputo [1,2]

Angelo Auricchio [*]

Fondazione Ticino Cuore, Breganzona, Switzerland

Cardiocentro Ticino Institute, Ente Ospedaliero Cantonale, Lugano, Switzerland

[*] Corresponding author at: Division of Cardiology Cardiocentro Ticino Institute, Ente Ospedaliero Cantonale Lugano, Switzerland. E-mail address: angelo.auricchio@cardiocentro.org (A. Auricchio),

Chiara Vanetta

Ruggero Cresta

Claudio Benvenuti

Fondazione Ticino Cuore, Breganzona, Switzerland

Received 9 July 2021

Accepted 14 July 2021

https://doi.org/10.1016/j.resuscitation.2021.07.024

[1] The authors contributed equally to the manuscript.

[2] The authors contributed equally to the manuscript.