VIA MEDICA

EDITORIAL

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Out-of-hospital cardiac arrest and COVID-19 pandemic

Key words: OHCA, COVID-19

The COVID-19 pandemic has caused profound changes in the functioning and effectiveness of healthcare worldwide. In particular, access to pre-hospital care has deteriorated, which was of particular importance for the effectiveness of treatment in patients with out-of-hospital cardiac arrest (OHCA). Regardless of this, infection with SARS-CoV-2 virus is a factor contributing to the occurrence of acute cardiovascular events, including OHCA.

Recently numerous reports regarding the impact of COVID-19 on the incidence of OHCA have been published. During the first wave of the COVID-19 pandemic in London, a dramatic rise in the incidence of OHCA, accompanied by a significant reduction in survival was observed. Moreover, the pattern of increased incidence and mortality closely reflected the rise in confirmed COVID-19 infections [1]. These observations were in line with the data collected from European, Australian, New Zealand and U.S. largest cities reviling showing significant OHCA escalations generally parallel to the local prevalence of COVID-19. Importantly, most of these patients died without COVID-19 testing [2]. Data from the North East England Ambulance Service revealed that despite reduced incidence of emergency calls during the pandemic compared with 2019, there was a rise in the incidence of OHCA and OHCA deaths during the same period [3]. Also, Glober et al. [4] observed increased OHCA incidence during the COVID-19 pandemic when compared with the prior year. Although patient characteristics were similar, initial shockable rhythm and proportion of patients who died in the hospital decreased during the pandemic. Rollman et al. [5] compared emergency medical services responses to out-of-hospital cardiac arrest (OHCA) and ST-segment–elevation myocardial infarction (STEMI) during the 2020 COVID-19 pandemic to 2018 to 2019 and evaluated the impact of California's March 19, 2020, stay-at-home order. Increase of weekly OHCA counts (173 *vs.* 135; incidence rate ratios, 1.28; 95% CI, 1.19–1.37; $p < 0.001$) and decrease of STEMI (57 *vs.* 65; incidence rate ratios, 0.87; 95% CI, 0.78–0.97; $p = 0.02$) was found [5]. Wienbergen et al. [6] reported a significantly higher rate of patients admitted with cardiogenic shock (21.9% *vs.* 14.2%, $p < 0.01$) and out-of-hospital cardiac arrest (OHCA) (14.3% *vs.* 11.1%, $p < 0.01$) comparing the presentation of STEMI patients in the year 2020 with the years 2006 to 2019 in a German registry. In England, a significant increase in the incidence of OHCA in patients with acute myocardial infarction during the COVID-19 period paralleled with reduced access to guideline-recommended care and increased in-hospital mortality was observed [7]. The increased OHCA incidence and worse outcomes were also observed in Singapore and Poland during the COVID-19 pandemic [8, 9]. An increased in OHCA incidence by 62% during COVID-19 was observed in Detroit, without, however, a significant change in prehospital return of spontaneous circulation (ROSC) [10]. On the other hand, early during the pandemic, rates of sustained ROSC for OHCA were lower throughout the

Medical Research Journal 2021; Volume 6, Number 2, 83–85, DOI: 10.5603/MRJ.2021.0029, Copyright © 2021 Via Medica, ISSN 2451-2591, e-ISSN 2451-4101
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US, even in communities with low COVID-19 mortality rates [11]. Overall survival was also lower, primarily in communities with moderate or high COVID-19 mortality [11]. Contrary to most of the publications in the Netherlands during the first COVID-19 lockdown, the incidence of OHCA remained on the sable level, while there was a significant reduction in the number of patients with chest pain or STEMI [12]. A Spanish Nationwide Prospective Cohort Study showed that during the COVID-19 period, the incidence of resuscitation attempts declined and survival to hospital admission (OR = 1.72; 95%CI = 1.46–2.04; p < 0.001) and discharge (OR = 1.38; 95%CI = 1.07–1.78; p = 0.013) fell compared to the non-COVID period. This pattern was also observed when comparing non-pandemic weeks and pandemic weeks. COVID-19 incidence impinged significantly upon outcomes regardless of regional variation, with low, medium, and high incidence regions equally affected [13]. According to the report from the Swedish Registry for Cardiopulmonary Resuscitation during the pandemic phase, COVID-19 was involved in at least 10% of all OHCA cases. In this subset of patients, the 30-day mortality was 3.4-fold increased as compared to non-COVID patients [14]. Assessment of cardiopulmonary resuscitation practices during the COVID-19 period revealed a decrease in the initiation of these procedures regardless of whether patients were suspected of SARS-CoV-2 infection or not [15]. Therefore, it is extremely important to communicate good CPR practices to avoid a drastic and lasting reduction in survival after OHCA [15–17]. Two meta-analyzes agreed that the incidence and mortality following OHCA were higher during the COVID-19 pandemic [18, 19]. Moreover, Borkowska et al. [19] showed that suspected or diagnosed COVID-19 resulted in a reduced survival rate after OHCA, probably due to the lower rate of shockable rhythms in COVID-19 patients, but not due to reluctance to bystander CPR.

COVID-19 has significantly impacted outcomes in OHCA patient through decreased access to medical care, and the reshaping of emergency medical response and hospital-based healthcare systems and policies. Moreover, changes in patient behaviour towards seeking help during the pandemic and the long-term consequences of not doing so should be taken into account [20–22]. Recently results of the OSCAR-POL registry have been published in Cardiology Journal [21]. This long-term observation from 2006 to 2018 showed circadian, monthly and seasonal variability of OHCA occurrence with no differences between particular days of the week. Significant circadian variability was observed within days of the week, seasons of the year, and particular years. Further in-depth studies on the impact of COVID-19 on the variability patterns of OHCA occurrence are necessary [23–26]. The research mainly based on registries should consider previously demonstrated risk factors and treatments [27–31]. This approach will allow to a full assessment of the impact of COVID-19 on OHCA.

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