





# The impact of COVID-19 pandemic on out-of-hospital cardiac arrests: a systematic review and meta-analysis

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## Background

Ambulance response time  $(11\pm5.1 \text{ vs } 9.0\pm3.7 \text{ minutes}; MD=1.06; 95\% CI, 0.61-1.50; P<0.001),$  patients with non-shockable rhythms (17367/20631 [84%] vs. 19257/23933 [80%]; OR=1.27; 95% CI, 1.09-1.48; P<0.001), and use of supraglottic airways devices (2368/6611 [36%] vs. 1664/16637 [10%]; OR=2.39; 95% CI, 1.08-5.30; P<0.03) increased.

In the hypothesis that the COVID-19 pandemic may have direct and indirect effects on out-of-hospital cardiac arrests in addition to its directly attributed mortality, we conducted a systematic review and meta-analysis to quantify these effects.

### **Methods**

We searched PubMed and EMBASE up to April 5, 2021 for peer-reviewed studies comparing out-ofhospital cardiac arrests occurring during the COVID-19 pandemic and a non-pandemic period.

### Results

We included 23 studies. During the COVID-19 pandemic we noted a lower rate of: return of spontaneous circulation (4370/24353 [18%] vs. 7401/34510 [21%]; OR=0.65; 95% CI, 0.55–0.75; P<0.001); survival to hospital discharge (526/10632 [4.9%] vs. 1224/16290 [7.5%]; OR=0.52; 95% CI, 0.42–0.65; P<0.001); resuscitation attempts by emergency medical services (10500/19218 [55%] vs. 15658/28734 [55%]; OR=0.81; 95% CI, 0.68–0.97; P=0.02); and endotracheal intubation (3349/7996 [42%] vs. 7032/19468 [36%]; OR=0.55; 95% CI, 0.40–0.76; P<0.001) when compared to non-pandemic periods.

Figure 1. Forest plot for the rate of survival at hospital discharge or at 30 days (A) df = degrees of freedom, M–H = Mantel-Haenszel, CI = confidence interval.

### A) Survival

1	COVID-19 period		Non-pandemic period		Odds Ratio		Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Baert 2020 (France)	26	937	99	1546	8.8%	0.42 [0.27, 0.65]	
Baldi 2020 (Lombardy, Italy)	16	314	21	321	5.9%	0.77 [0.39, 1.50]	
Ball 2020 (Victoria, Australia)	22	380	142	1218	8.5%	0.47 [0.29, 0.74]	
Chan 2020 (USA)	239	3632	332	3393	12.8%	0.65 [0.55, 0.77]	-
Fothergill 2020 (London, UK)	49	1108	70	658	9.8%	0.39 [0.27, 0.57]	
Jae Wan Cho 2020 (Daegu, South Korea)	8	171	14	158	4.1%	0.50 [0.21, 1.24]	
Marijon 2020 (Paris, France)	16	517	164	3052	7.7%	0.56 [0.33, 0.95]	
Navalpotro-Pascual 2021 (Madrid, Spain)	4	313	17	306	3.0%	0.22 [0.07, 0.66]	·
Nishiyama 2021 (Osaka City, Japan)	68	825	80	862	10.4%	0.88 [0.63, 1.23]	
Ortiz 2020 (Spain)	16	517	164	3052	7.7%	0.56 [0.33, 0.95]	
Semeraro 2020 (Bologna, Italy)	23	624	22	563	6.8%	0.94 [0.52, 1.71]	
Sultanian 2021 (Sweden)	17	1016	65	930	7.4%	0.23 [0.13, 0.39]	
Uy-Evanado 2020 (Oregon and California, USA)	22	278	34	231	7.1%	0.50 [0.28, 0.88]	
Total (95% CI)		10632		16290	100.0%	0.52 [0.42, 0.65]	◆
Total events	526		1224				
Heterogeneity: Tau <sup>2</sup> = 0.09; Chi <sup>2</sup> = 32.91, df = 12 (P = 0.001); I <sup>2</sup> = 64%							
Test for overall effect: Z = 5.86 (P < 0.00001)	_						0.1 0.2 0.5 1 2 5 10
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### Conclusions

Out-of-hospital cardiac arrests during the COVID-19 pandemic had worse short-term outcomes than a non-pandemic period. Although these findings might be a direct effect of COVID-19, an indirect effect from lockdown and healthcare reorganization contributed by increasing ambulance response times and changing resuscitation practices in the pre-hospital setting including airway management.

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