



## The collateral damage of COVID-19: cardiovascular disease, the next pandemic wave

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Evidence and data collected during the pandemic outbreak show that COVID-19 has had a significant impact on patients with cardiovascular disease (CVD). The effects of COVID-19 on cardiovascular health are multifaceted and triggered by different factors including:

- **Patient vulnerability and lack of assurance that safe in-hospital wards will be provided to non-COVID patients**: CVD patients infected with COVID-19 have increased rates of complications and death. Because of this, high risk CVD patients such as those experiencing a heart attack or stroke have been reluctant to seek help resulting in significant reduction in admission for heart attacks and stroke in Europe and elsewhere and an increase in preventable death and disability.
- **Increased pressure on ambulance services**: this has resulted in late presentation to hospital of heart attacks and stroke patients – often too late to benefit from life-saving treatments.
- **Re-prioritisation of hospital resources**: this has significantly decreased access to cardiovascular services and elective procedures as well as led to a drastic reduction in the availability of cardiac surgery.

**COVID-19 and CVD are closely intertwined.** With the SARS-CoV-2 infection still not being under control, understanding and addressing the collateral damage of COVID-19 on CVD is crucial if we want to prevent CVD being the next pandemic wave.

### What the European Society of Cardiology calls for?

- The creation of **agile and rapidly responsive Europe-wide health-data collection** (through registries or via discharge summaries and electronic health record) which allows a rapid feedback on admission and outcome trends
- Develop **separate and safe treatment pathways** so that patients can be managed safely in the event of a cardiac emergency
- **Resume CVD clinical care services** as soon as possible and in a safe environment so that CVD prevention, diagnostic and treatment can take place in a “quasi-normal” environment
- **Robust randomized evidence** to support clinicians’ decisions on which treatments should be recommended for all COVID-19 patients and for those with pre-established CVD or at high risk of developing CVD in particular
- Support **high-quality prospective studies** to better understand the mechanisms through which pre-established CVD worsen the prognosis in COVID-19 and assess whether COVID-19 increases cardiovascular risk and cardiovascular sequelae
- Support **investment in cardiovascular research and innovation** so that new, affordable therapies can be developed for conditions where current treatments may temporarily relieve symptoms but do not improve patient outcomes, such as death and disability.

Based on surveys that the European Society of Cardiology has conducted of its members and of other evidence available so far, this paper outlines how COVID-19 has impacted CVD and provides recommendations for mitigating actions to save lives and reduce suffering.

### **Impact of COVID-19 on emergency cardiovascular care**

During the pandemic outbreak, and in particular during the confinement period, far fewer patients than usual have called for help or visited hospital emergency units with heart attacks and strokes.

A survey of more than 3,000 health professionals from 141 countries in six continents shows there has been an important decline in patients admitted to hospital for heart attack during the pandemic.

The responses received showed that most (~80%) health professionals felt there had been a decrease in presentations, with the large majority of survey participants reporting at least a 40% reduction. These findings were largely consistent across 6 continents and, although based on self-reported perceptions, they are supported by objective evidence from European and the US registries suggesting a 25% to 40% average reduction in heart attack presentations during the outbreak<sup>1</sup>.

Evidence by the European Stroke Association shows a similar decline in emergency admissions of stroke patients<sup>2</sup>.

Furthermore, half of the heart or stroke patients who presented to hospital, did so late and often outside the time frame for an effective emergency intervention, with further impact on both survival and morbidity.

The causes of this reduction or delay in admissions are diverse and include patients' reluctance to go to hospital for fear of being exposed to COVID-19 and/or to overload an already stretched health service, as well as a delay in response of an overloaded ambulance & emergency service.

### **Re-organisation of hospital services due to COVID-19**

In preparation for the pandemic and to respond to it, many hospitals have had to significantly re-organise their services, including deferring elective cardiac procedures. The considerable impact on CVD services has been confirmed by the ESC survey, with around 50% of the respondents reporting that their ward or department has been restructured due to the pandemic.

A separate survey conducted by the ESC on the impact of COVID-19 also showed that structural heart intervention programmes have been profoundly affected, with only 12% of the responders stating that transcatheter aortic valve implantation programmes run unchanged while a complete discontinuation of the procedure was reported by 47% of respondents. The corresponding proportions for transcatheter mitral valve repair are 12% and 65%. Among centres that have discontinued a specific procedure, the process has been abrupt and faster for elective than for urgent interventions.<sup>3</sup>

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<sup>1</sup> G. Pessoa-Amorim et al. *Admission of patients with STEMI since the outbreak of the COVID-19 pandemic. A survey by the European Society of Cardiology*, Eur Heart J Qual Care Clin Outcomes 2020, <https://academic.oup.com/ehjqcco/advance-article/doi/10.1093/ehjqcco/qcaa046/5848410>

<sup>2</sup> <https://eso-stroke.org/likely-increase-in-the-risk-of-death-or-disability-from-stroke-during-the-covid-19-pandemic/>

<sup>3</sup> M. Roffi et al. *Impact of the COVID-19 Pandemic on Interventional Cardiology Practice: Results of the EAPCI Survey*, EuroIntervention 2020, <https://eurointervention.pconline.com/article/impact-of-the-covid-19-pandemic-on-interventional-cardiology-practice-results-of-the-eapci-survey>

While in this exceptional emergency, the re-organisation of hospital services to prepare for the influx of COVID-19 patients has been necessary, the subsequent massive reduction in cardiology procedures will have a significant impact on CVD mortality and morbidity beyond the pandemic.

### **COVID-19 damage to the cardiovascular system**

While COVID-19 primarily affects the lungs, causing severe acute respiratory distress syndrome, it also affects other organs, including the heart. Cardiovascular complications linked to COVID-19 are wide ranging and include: cardiac injury, arrhythmia and heart failure. A study by the National Health Commission of China reported that during the initial outbreak, some patients presented with primarily cardiovascular symptoms, such as palpitations and chest tightness, rather than respiratory symptoms<sup>4</sup>.

Pre-existing cardiovascular conditions seem to be particularly important predictors of COVID-19 severity. Studies from China have shown that 15–40% COVID-19 patients had a history of cardiac disease and 10–30% showed laboratory signs of cardiac injury and cardiovascular involvement, associated with a more severe clinical course.<sup>5 6 7 8 9 10</sup>

Analysis of all COVID-19 cases reported to China's Infectious Disease Information System up to 11 February 2020 have shown that the fatality rate for patients with no comorbidities was less than 1%, whereas it was of more than 10% for patients with CVD - compared to around 7% for those with diabetes, 6% for subjects with hypertension, 6% for those with chronic respiratory disease, and 6% for those with cancer.<sup>11</sup>

These values are likely to be higher in COVID-19 patients in Europe because of the older age of the population. A study conducted in the Brescia area of the Lombardy region in Northern Italy has reported a significantly higher mortality for cardiac patients compared with non-cardiac patients (35.8% vs. 15.2%)<sup>12</sup>.

COVID-19 also seems to be associated to the development of blood clots. Studies from the Netherlands and France suggest that clots arise in 20–30% of critically ill COVID-19 patients.<sup>13 14</sup> Scientists have a few plausible hypotheses to explain the phenomenon, and they are just beginning to launch studies aimed at gaining mechanistic insights. Physicians in New York have recently sounded the alarm about blood clots and strokes, which are striking even healthy young people with no known risk factors — and sometimes no other symptom of the virus<sup>15</sup>.

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<sup>4</sup> Ying-Ying Zheng et al. *COVID-19 and the cardiovascular system*, Nature Reviews Cardiology volume 17, 2020, <https://www.nature.com/articles/s41569-020-0360-5>

<sup>5</sup> Guan WJ et al. *Clinical characteristics of coronavirus disease 2019 in China*, N Engl J Med 2020

<sup>6</sup> Zhou F et al. *Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study*, Lancet 2020

<sup>7</sup> Huang C et al. *Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China*, Lancet 2020

<sup>8</sup> N Chen et al. *Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study*, Lancet 2020

<sup>9</sup> S Shi et al. *Association of cardiac injury with mortality in hospitalized patients with COVID-19 in Wuhan, China*, JAMA Cardiol 2020

<sup>10</sup> T Guo et al. *Cardiovascular implications of fatal outcomes of patients with coronavirus disease 2019 (COVID-19)*, JAMA Cardiol 2020

<sup>11</sup> S Ruan. *Likelihood of survival of coronavirus disease 2019*, Lancet Infect Dis 2020, [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30257-7/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30257-7/fulltext)

<sup>12</sup> Riccardo M Inciardi et al. *Characteristics and outcomes of patients hospitalized for COVID-19 and cardiac disease in Northern Italy*, European Heart Journal, Volume 41, Issue 19, 14 May 2020, <https://academic.oup.com/eurheartj/article/41/19/1821/5834516>

<sup>13</sup> F.A. Klok et al. *Incidence of thrombotic complications in chronically ill patients with COVID-19*, Thromb. Res. 2020.04.013 (2020), [https://www.thrombosisresearch.com/article/S0049-3848\(20\)30120-1/pdf](https://www.thrombosisresearch.com/article/S0049-3848(20)30120-1/pdf)

<sup>14</sup> J. Poissy et al. *Pulmonary Embolism in COVID-19 Patients: Awareness of an Increased Prevalence*, Circulation (24.04.2020), <https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.120.047430>

<sup>15</sup> <https://www.nejm.org/doi/full/10.1056/NEJMc2009787>

## Cardiovascular implications of social distancing

COVID-19 implications are wider than the effects of the disease on individual patients. Practically all countries affected by the disease developed mitigation and containment strategies based on social distancing. Cardiovascular consequences of social distancing may be profound. The absence of positive relationships and the reduced chance of interaction with other people have been identified as major risk factors for cardiovascular mortality. A recent meta-analysis including a total of more than 180,000 participants demonstrated that the risk for ischaemic heart disease and stroke increased by 29% and 32%, respectively, in lonely and socially isolated people. Similar results were reported from a UK Biobank analysis<sup>16</sup>.

**Additional information and evidence on COVID-19 and CVD** is available from this link:

[www.escardio.org/Education/COVID-19-and-Cardiology](http://www.escardio.org/Education/COVID-19-and-Cardiology)

## How to reduce collateral damage of COVID-19 on CVD?

It is evident that COVID-19 will have a cardiovascular memory. The question is not if the pandemic will have a CVD collateral damage, but rather the size of that damage, or in other words what would be the impact of COVID-19 on cardiovascular death and disability.

While it is now too late to avoid the damage caused to the cardiovascular health of many patients, it is of paramount importance to understand it so that evidence-based measures can be put in place to avoid COVID-19 becoming the springboard for a new cardiovascular pandemic.

**Even before the pandemic outbreak, the burden of CVD was greater than that of any other disease and the leading cause of death in Europe and in the world.** The most recent data estimate that, in the EU, more than 60 million people live with CVD, and that close to 13 million new cases of CVD occur every year. CVD accounts for 36% of all deaths (as a comparison, cancer accounts for 26% of all deaths in the EU).<sup>17</sup> Globally, cardiovascular disease is also the **primary cause of death claiming the lives of 17.9 million people every year**; of these deaths, 85% are due to heart attack and stroke and **~37% are premature** (below the age of 70)<sup>18</sup>.

## How much will these numbers grow post COVID-19?

The **repercussions of the pandemic on CVD mortality and morbidity risk being exponential unless bold policy action is taken.** Therefore the European Society of Cardiology calls on health ministers and other decision-makers in charge of the management of healthcare systems to put in place the following measures without hesitation:

- The creation of **agile and rapidly responsive Europe-wide health-data collection** (through registries or via discharge summaries and electronic health record) which allows a rapid feedback on admission and outcome trends. This is of paramount importance in a health emergency, but also

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<sup>16</sup> Tomasz J Guzik et al. *COVID-19 and the cardiovascular system: implications for risk assessment, diagnosis, and treatment options*, Cardiovascular Research, cvaa106, <https://academic.oup.com/cvrc/advance-article/doi/10.1093/cvr/cvaa106/5826160>

<sup>17</sup> Institute for Health Metrics and Evaluation. Global Burden of Disease database (2017), <http://www.healthdata.org/gbd>

<sup>18</sup> WHO CVD statistics, [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))

essential for learning from individual countries' experience and planning and targeting health investment to reduce inequality.

- Ensure that patients can be treated safely in the case of cardiac emergencies through the development of **treatment pathways completely separate** to those being used for patients with the coronavirus to reduce their exposure to the risk of infections.
- **Resume CVD clinical activity** as soon as possible and in a safe environment, so that CVD prevention, diagnostic and treatment can take place in a "quasi-normal" environment. It is well reported that delaying visits and procedures lead to more severely damaged hearts and the need for more invasive and severe clinical interventions to try to fix them. As waiting times for several elective procedures are already quite long in different countries without the COVID-19 context, it is crucial to avoid any further delays.
- **Robust randomized evidence** is needed to support clinicians' decisions on which treatments should be recommended for COVID-19 patients with pre-established CVD or at high risk of developing CVD.
- Support **high-quality prospective studies** to better understand the mechanisms through which pre-established CVD worsen the prognosis in COVID-19 and assess whether COVID-19 increases cardiovascular risk and cardiovascular sequelae.
- Support **investment in cardiovascular research and innovation** so that new, affordable therapies can be developed for conditions where current treatments may temporarily relieve symptoms but do not improve patient outcomes, such as death and disability.