

# COVID-19 pandemic and infarctions: another call to reorganise our healthcare systems

Ovidio De Filippo <sup>1</sup>, Fabrizio D'Ascenzo <sup>2</sup>,  
Gaetano Maria Deferrari<sup>1</sup>

'Time is muscle'. It has been almost 50 years since Professor Eugene Braunwald introduced the revolutionary hypothesis that the severity and the extent of myocardial injury resulting from coronary occlusion could be radically reduced by timely interventions.<sup>1</sup> Since that time, research has focused on the identification of sources of delays, with the aim to optimise the delivery of care to patients suffering from acute myocardial infarction (AMI), thus minimising total ischaemic time from symptom onset to reperfusion therapy. This translated to guideline recommendations establishing several goals to be met in this context, such as optimal 'time to diagnosis' and 'time to reperfusion'. Healthcare systems have been promptly reorganised over the last decades according to such endorsements, mainly by implementing networks between hospitals ('hub' and 'spoke') and the definition of geographical areas of responsibility, sharing protocols based on risk stratification and transportation by trained staff in appropriately equipped ambulances. While this strategy proved to be successful in 'peaceful times', resulting in significant outcome improvement in patients suffering from AMI, such organisation was never tested within a benchmark 'crisis period' that was supposed to severely overwhelm national health systems. The COVID-19 outbreak and the consequential measures of governments to contain the pandemic (ie, 'national lockdowns') put a strain on the established system of cardiovascular assistance, calling into question many assumptions of our ordinary clinical practice. In this issue of *Heart*, Kwok and collaborators<sup>2</sup> reported a significant reduction in primary percutaneous coronary intervention (PCI) for ST segment elevation myocardial infarction

(STEMI) following the national lockdown in England. This finding supports the pieces of evidence arising from previous studies about a relevant reduction in hospital admissions for cardiovascular issues, such as acute coronary syndromes (ACS) and heart failure, during the COVID-19 pandemic.<sup>3,4</sup> Despite several hypotheses being first invoked to account for such phenomenon (ie, reduced exposition to stressful circumstances, effect of lockdown on air pollution), the recent work by Baldi *et al*<sup>5</sup> describing an increased incidence of out-of-hospital cardiac arrest in the most burdened Italian region during the pandemic closed the loop: COVID-19 killed at home. Such unpredictable behavioural response of patients related to the fear of contracting the disease, along with the perception of hospitals as unsafe places, highlighted the first shortcoming of the cardiovascular care system: public awareness of symptoms related to serious and life-threatening diseases such as ACS is still lacking. In a modern context, where a late-breaking study shows that initial ECG variations in patients with STEMI can be detected through a smartwatch, such finding sounds still more weird.<sup>6</sup> How is a system supposed to work if the first link in the chain is the weakest? The feeling coming from such regrettable

acknowledgement is that scientific production has been talking to itself for too long, thus forgetting that the goal of whatever we know, discover and discuss about is our patients' health. Search engine result pages supported by the WHO have been recommending to people seeking medical attention through web searches to stay home if feeling unwell, further preventing patients to activate emergency networks (partly with an honest desire to not engulf a massively stressed healthcare system) (figure 1). Responsibilities of the scientific world in such a huge failure in communication, along with its consequences, cannot be ignored. In hindsight, it could look far too easy to acknowledge that we could have been more proactive in reaching out to our patients during the lockdown, but that is not the point. The authors indeed also described a prolonged symptom-to-hospital time following the COVID-19 lockdown in England, with a significant delay both for patients admitted from the community and for those undergoing between-hospital transfers. Once again, we should be able to recognise that remote monitoring programmes and digital medical consultations are not yet deeply integrated into our clinical practice and that the territorial organisation of our healthcare systems is not as robust and capillary as we thought. Treatment delays represent the most easily assessed index of quality of care in patients with STEMI; thus, the authors' findings remark that we should carefully consider interventions to improve the efficiency of the AMI pathway in unordinary context. Such consideration is further supported by the increased 'door-to-balloon' time described by Kwok and collaborators.<sup>2</sup> The authors correctly point out that several factors may account

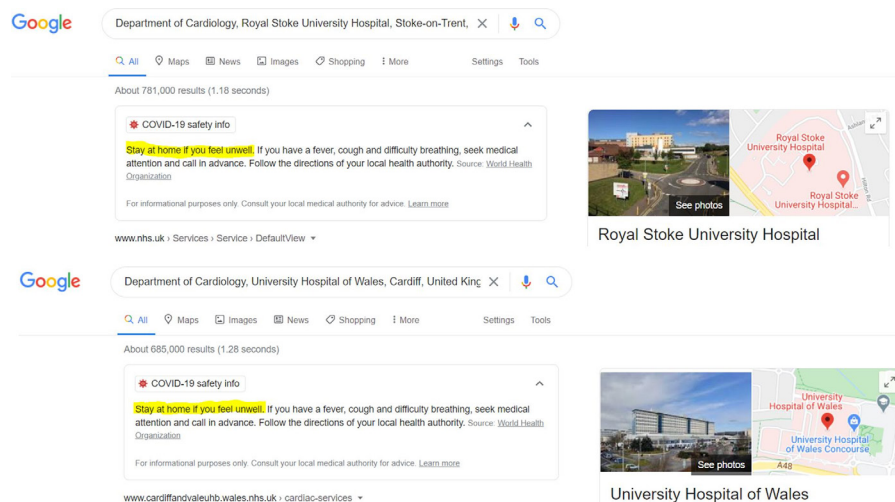


Figure 1 Search engine result pages advising patients to stay at home if feeling unwell.

<sup>1</sup>Division of Cardiology, Department of Medical Sciences, Città della Salute e della Scienza, University of Turin, Torino, Italy

<sup>2</sup>Division of Cardiology, Department of Medical Sciences, Città della Salute e della Scienza, University of Turin, Turin, Italy

Correspondence to Dr Fabrizio D'Ascenzo, Molinette, San Giovanni Battista, Torino, Italy; [fabrizio.dascenzo@gmail.com](mailto:fabrizio.dascenzo@gmail.com)

for such delay, such as the necessity of a more extensive patient evaluation prior to angiogram and the time needed for the PCI staff to don personal protective equipment. However, while such explanations may look adequate in an unprecedented context as the global pandemic was, major efforts should be carried to prevent this from happening again.

Of interest, the authors found no significant differences in overall mortality and reduction in in-hospital MACE (Major Adverse Cardiovascular Event, that is unplanned re-PCI, reinfarction and death) among patients with STEMI admitted during the lockdown as compared with those referred prior to such measure. However, it should be noted that the composite endpoint explored by the authors includes only a small subgroup of AMI-related complications. The previous work by De Rosa *et al*<sup>7</sup> exploring a broader spectrum of issues that can be related to a delayed reperfusion therapy (ie, cardiogenic shock, free wall rupture, life-threatening arrhythmias) found an increase in mechanical and electrical AMI complications along with a higher rate of STEMI fatality throughout the 1-week period during the COVID-19 outbreak as compared with the equivalent week in 2019. Furthermore, in the context of an increased rate of out-of-hospital cardiac arrests during the pandemic (as outlined above), the authors' data about in-hospital rates of mortality are far than been reassuring. Such finding could suggest that the sickest patients may have been dying before coming for medical attention. This hypothesis is further supported by the evidence of increased rates of in-hospital death and MACE among inpatients suffering from STEMI and undergoing in-hospital transfer.

Another interesting finding is that patients presenting after the lockdown were more likely to receive multivessel PCI. As the authors correctly point out, such finding could reflect both the evidence coming from the recent COMPLETE trial<sup>8</sup> and operators' awareness that due to re-organization of hospitals during lockdown it would be easier to perform complete PCI during index admission. While both these hypotheses

warrant further confirmation, we believe that the strategy of a complete revascularisation within the index procedure or at least within the index hospitalisation should be considered in protocols dedicated to management of patients with AMI in the COVID-19 era. This could indeed reduce patients' risk to wait for too long a staged revascularisation, the sanitary cost to reassess patients' COVID-19 status when readmitted (chest X-ray, nasal swab), and last but not least the risk for sanitary personnel to get exposed to patients coming back from the community.

In conclusion, the work by Kwok and collaborators, along with previous findings about this topic, highlighted that the emergency care network for patients suffering from acute cardiovascular illnesses has still several shortcomings, making it vulnerable in critical social and medical contexts. Increasing patient awareness of serious symptoms and inviting them to seek medical care in any case through dedicated campaigns, strengthening the territorial network with access points able to perform an ECG and to be in touch with hub centres, potentiating remote medical programmes with a clear definition of the roles and responsibilities of the healthcare professionals involved, getting an 'on call' dedicated staff trained to scrub in with protective equipment in a reasonable time, and setting up dedicated rooms where patients can undergo an extensive evaluation for the infection at a later time, thus prioritising angiography, are among the cornerstones of an 'emergency plan' that should be conceived and be easily available should a second wave of infections occur. Most European countries are now experiencing a phase of slowdown of the contagion. There is no better time than the present. Time is muscle, with and without an ongoing pandemic.

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#### ORCID iDs

Ovidio De Filippo <http://orcid.org/0000-0002-4915-9501>

Fabrizio D'Ascenzo <http://orcid.org/0000-0002-6646-9317>

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