

Time to treatment still matters in ST-elevation myocardial infarction: a call to maintain treatment effectiveness during the COVID-19 pandemic

On 11 March 2020, the World Health Organization declared the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak a pandemic due to the constantly increasing number of cases worldwide. Patients with SARS-CoV-2 infection can develop coronavirus disease 2019 (COVID-19), which results in high rates of hospitalization and intensive care unit (ICU) admission. This exponential surge of patients requiring ICU admission for respiratory support forced health and government officials to rapidly respond to the outbreaks, by dedicating most of the health resources to treat these high-risk patients.¹ At the same time, there is an urgent need to manage cardiovascular time-dependent emergencies, including acute myocardial infarction, with appropriate standards of care and dedicated preventive measures and pathways against the risk of SARS-CoV-2 infection.² Thus, although fully recognizing the unprecedented strain on world healthcare systems of COVID-19, the cardiology community is striving to guarantee the best and safest treatment for all ST-elevation myocardial infarction (STEMI) patients.² Notably, in these patients, the early implementation of pharmacological or mechanical reperfusion therapies is critical, and significantly improves survival by rapidly re-establishing coronary blood flow within the occluded infarct-related artery.³

A matter of serious concern during the pandemic is that the proven therapies for STEMI might be compromised by the tremendous pressure exerted on the healthcare system by the viral outbreak, as the effectiveness of these life-saving treatments may be limited by delays in delivery.³ We believe that every effort should be made in order to develop dedicated and well-designed STEMI in-hospital pathways and to make patients aware of cardiac symptoms and the importance of seeking medical attention in a timely fashion. The latter point should be emphasized because data are growing, both

in Europe⁴ and in the USA,^{5,6} showing that the number of STEMI patients presenting for emergency care is not in line with the pre-pandemic levels. This indicates that people are reluctant to go to hospital due to the fear of COVID-19, with many STEMI patients not seeking care at all. If this phenomenon continues to persist, then the death rate will extend far beyond that directly associated with COVID-19.

A Spanish report compared the activity of 81 intensive cardiac care units (ICCU) during a week before the pandemic (24 February–1 March 2020) with that of a week during the pandemic (16–22 March). The authors observed a significant reduction in ICCU activity mainly due to a marked decrease in STEMI hospitalization, with a concerning 40% decline in primary percutaneous coronary intervention (PCI).⁴ Similarly, a preliminary analysis during the early phase of the COVID-19 pandemic showed a 38% reduction in STEMI activations of US cardiac catheterization laboratories.⁵ Moreover, a survey at <http://angioplasty.org>,⁶ an online worldwide community of cardiologists, reported a 40–60% reduction in hospitalizations for acute coronary syndrome in the last months.⁶ These figures are paralleled by an increase in the rate of out-of-hospital cardiac arrest. Of note, in New York City from 30 March to 5 April 2020 there were 1990 cardiac arrest calls, a rate that is four times higher and was associated with an eight times higher mortality than those reported during the same time interval a year before.⁶

Another effect of the fear of the pandemic is that many STEMI patients seek medical attention late, when their condition has markedly worsened. A study performed in Hong Kong (Southern China) during the COVID-19 epidemic showed long delays in seeking medical help in a small cohort of STEMI patients, with a median time of 318 min from symptom onset to first medical contact. Notably, before the epidemic, the median time was only 82 min.⁷

Our initial clinical experience is in agreement with these alarming data. Of note, since 20 February 2020, when the first patient was diagnosed with COVID-19 in Italy, we observed a significantly worse outcome in STEMI patients admitted to our ICCU (University Cardiology Centre in Milan, Italy), when compared with those of the same time interval in the previous year (Table 1). In particular, we analysed STEMI

patients that were admitted to our ICCU from 20 February to 4 May 2020, and compared them with STEMI patients admitted during the same time period in the previous year. The higher number of STEMI patients admitted to our centre during the COVID-19 outbreak is mainly due to the decision of the Government of Lombardy to centralize the treatment of STEMI in a very limited number of centres, including ours that, since 8 March 2020, became a referral centre for cardiovascular emergencies in a regional hub and spoke system. The two study groups were similar in terms of age, rate of diabetes mellitus, and history of previous acute myocardial infarction. We observed a two-fold longer time from symptom onset to hospital presentation and a three-fold higher rate of cardiogenic shock and in-hospital cardiac mortality during the COVID-19 outbreak when compared with those during the same time interval in 2019 (Table 1). Thus, despite the limited time period of our observation and the small number of STEMI patients considered, our initial report seems also to point towards to an increased mortality in STEMI patients after the pandemic outbreak. The mechanisms underlying this worse short-term outcome cannot be deduced from our preliminary experience. Yet, the significant delayed hospital presentation of STEMI patients observed in our centre during the COVID-19 pandemic may result in a higher rate of arrhythmic and mechanical complications and, consequently, a higher in-hospital mortality.⁸

This phenomenon is still occurring despite all centres now working on measures and pathways to protect patients against the infection risk, at the same time providing the best treatment strategy for STEMI (primary percutaneous coronary intervention) during the COVID-19 outbreak. Although many questions remain unanswered, we believe that every effort should be made to convince patients not to delay seeking life-saving treatments. Scientific societies and health authorities should promote a campaign to make the public aware that they should demand timely assistance in the case of suggestive symptoms. The ultimate goal is to preserve the life-saving focus on universal and rapid STEMI diagnosis and treatment, even at a time of a dynamic global crisis.

Conflict of interest: none declared.

Table 1 Patients with ST-elevation myocardial infarction admitted to our centre from 20 February to 4 May 2020, as compared with the same time period in 2019

	2020	2019
STEMI patients, <i>n</i>	76	43
Age (years)	64 ± 12	65 ± 13
Males, <i>n</i> (%)	63 (83%)	33 (47%)
Diabetes mellitus, <i>n</i> (%)	21 (29%)	11 (26%)
Previous acute myocardial infarction, <i>n</i> (%)	11 (14%)	6 (14%)
Coronary angiography/primary PCI, <i>n</i> (%)	76 (100%)	43 (100%)
Time to treatment (h)	7.5 ± 4.8	3.1 ± 2.4
LV ejection fraction (%)	41 ± 11	49 ± 12
hs-Tnl peak value (ng/L)	291.187 ± 119.218	132.236 ± 49.346
Out-of-hospital cardiac arrest, <i>n</i> (%)	9 (12%)	2 (5%)
Cardiogenic shock, <i>n</i> (%)	16 (21%)	4 (9%)
LV apical thrombus at admission, <i>n</i> (%)	5 (6%)	0 (0%)
High-degree AV block, <i>n</i> (%)	9 (12%)	2 (5%)
In-hospital cardiac death, <i>n</i> (%)	15 (19%)	2 (5%)
Positive COVID-19 swab at admission, <i>n</i> (%)	6 (8%)	—
In-hospital death due to COVID-19, <i>n</i> (%)	0	—

AV, atrioventricular; COVID-19, coronavirus disease 2019; hs-Tnl, high-sensitivity troponin I; LV, left ventricular; PCI, percutaneous coronary intervention; STEMI, ST-elevation acute myocardial infarction.

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