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Impact of COVID-19 outbreak and public lockdown on ST-segment elevation myocardial infarction care in Spain

Running title: STEMI care during COVID-19 in Spain

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Acute ST-segment elevation myocardial infarction (STEMI) is a cardiovascular disease with high morbidity and mortality. Reperfusion therapy using primary percutaneous coronary intervention (pPCI) is the most frequently recommended treatment [1, 2].

“Time is myocardium”, therefore, health systems are organised as networks to minimise ischemic time by means of quick diagnosis and prompt myocardial reperfusion. Treatment delays are the simplest indexes of quality of care to monitor the STEMI network: time-to-first-medical-contact (FMC), door-to-device (DTD) time and total ischemic time (TIT) are key parameters for assessing the efficiency of the pPCI pathway [1, 2].

Coronavirus disease 2019 (COVID-19) has submitted to the healthcare systems an enormous strain in the nations where it is widespread [3], with implications for their

ability to maintain operational integrity to high acuity patients [4]. To date, little is known about the influence of the disease on STEMI care systems.

Herein, it was sought to describe the impact of the COVID-19 outbreak on STEMI care at a tertiary level hospital with a 700,000-person reference population area in Coruña, a city in the Northwest of Spain. The hospital had offered 24/7 pPCI with a well-established network since 2005 [5], and was maintaining the pPCI system during the pandemic time. Patients with STEMI were included and were admitted via the Emergency Department (ED), the Emergency Medical System (EMS) and non-PCI centres undergoing pPCI during the first 6 weeks of the public lockdown period, i.e. from 15th March to 25th April 2020. These data were compared to those from STEMI patients undergoing pPCI in the same facility for the same time period for the prior 5 years. Exclusion criteria were STEMI inpatients and cardiac arrest patients. Time-to-FMC was defined as the time from patient-reported onset of chest discomfort to the time to establish first medical contact. DTD time was defined as the time between first hospital arrival to wire crossing. TIT was defined as the time from FMC to wire-crossing. Descriptive statistics were summarized as medians with interquartile ranges (IQR). The differences between groups were compared with the Mann-Whitney test. Statistical analysis was performed using STATA version 16. Ethics approval was obtained from the local committee in the study institution.

From 15th March to 25th April 2020, 26 STEMI patients underwent pPCI, while 204 patients underwent pPCI during the same period in the preceding 5 years. During the period of public lockdown, STEMI incidence rate (per 100,000 population-year) significantly decreased (50.51 to 32.19; $p < 0.0001$); time-to-FMC became longer (median, 282 min [IQR 106–465] vs. 86 min [IQR 39–174]; $p < 0.0001$); as well as TIT (median, 341 min [IQR 228–579] vs. 195 min [IQR 140–298]; $p = 0.0005$). No significant differences were found between DTD times (median, 97 min [IQR 33–128] vs. 68 min [IQR 37–106]; $p = 0.57$) (Fig. 1).

Patients with STEMI underwent pPCI during the COVID-19 outbreak are being subjected to longer myocardial reperfusion times. The prolongation of time-to-FMC and TIT can be explained by a patients' hesitation to initiate contact with the healthcare system because they fear a nosocomial infection; and once they decide to seek medical help, it can be delayed due to ED or EMS collapse.

The present study has several limitations. Firstly, this single-center retrospective study was performed over a short period of time, with a low number of patients in the COVID-19 arm. Likewise, it was not possible to completely rule out a temporary trend in lower STEMI incidence.

Both the current COVID-19 outbreak and the public lockdown in most nations of the world demand the development of plans from healthcare systems to mitigate the impact of this communicable pandemic diseases and to protect vulnerable patients with cardiovascular disease from both the nosocomial infection and the self-imposed refrainment from accessing healthcare.

Further investigation is needed to evaluate how COVID-19 affects cardiovascular disease and the healthcare of these patients, as well as clinical outcomes.

Conflict of interest: None declared

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Figure 1. Boxplot comparisons of primary percutaneous coronary intervention (pPCI) pathway times. Boxplot comparisons of pPCI times between ST-segment elevation myocardial infarction (STEMI) patients during COVID-19-time and STEMI patients for the same period of time for the prior 5 years.

