

The COVID-19 Storm and Rebooting Interventional Cardiology After the First Wave

Lessons learned from Spain.

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The SARS-CoV-2 pandemic has caused > 14.7 million detected cases of coronavirus disease 2019 (COVID-19) and > 612,000 deaths worldwide as of mid-July 2020.¹ The rapid spread of the virus and the lack of antiviral treatments or a vaccine has overwhelmed most health care systems (even in highly developed countries), which have seen their critical care capacities exceeded.

The negative effects of COVID-19 on public health have occurred not only through the infection itself but also the effect of confinement and the adverse impact of the population's perceptions about the risk involved with visiting medical facilities for any health problem. Proof of the latter is the repeated observations of a noticeable reduction in the number of patients treated for myocardial infarction during the outbreak.^{2,3} It is highly plausible that what has been seen with ischemic heart disease could be extrapolated to other pathologies, either cardiovascular or not.

Spain was the second country in Europe (after Italy) that was reached by the first wave of the outbreak in late February to early March of 2020. The country has been hard struck by the pandemic. In this article, we share our analysis of how the outbreak and the aftermath were managed in an amalgamation of four different experiences, coming from diverse regions of the country (Madrid, Barcelona, Salamanca, and Santander).

WHAT WAS DONE WRONG

At the very beginning, the consequences of COVID-19 were clearly underestimated, both by health authorities and media. A similarity was established between COVID-19 and the flu regarding lethality. As of February 21, nine European countries had reported 47 cases. As of March 5, there were 4,250 cases. At that point, an uncontrolled spread of COVID-19 was evident in Europe. However, most European authorities (as well as from Spain) denied this fact, and social distancing measures were not implemented until a long time after.

We also underestimated the spread capacity of the SARS-CoV-2 virus. Several important events were celebrated during the first days of March, despite knowing that the virus had been present in Spain for at least 1 month (the first case was reported on January 31) and there had already been reported deaths (first reported death was February 13).

During the first weeks, detection of the infection did not follow strict protocols. This resulted in some patients only being diagnosed once they had spread the virus to other patients or to health care workers.

There was a lack of polymerase chain reaction (PCR) swab tests or restricted access to testing for the population, for both patients and health care workers. Overall, the protection of health care staff was very poor during the acute phase of the pandemic, with limited access to adequate personal protective equipment (PPE). This explains why Spain has had the highest number of infected health care workers in the world. The most affected professionals were those working on the front lines, such as in primary care and emergency departments. Out of 245,000 confirmed cases in Spain by mid-June, 52,000 (21%) were health care workers.^{4,5}

In the first days of the outbreak, no clear pathways or protocols were established for managing patients in hospitals, either with or without suspected infection. In the cath labs, neither patients nor the health care staff were tested for COVID-19 and the PPE that was used consisted of conventional protection levels. During the first weeks of the outbreak, a significant reduction of ST-segment elevation myocardial infarction (STEMI) admissions was observed.² Potential causes of this include avoidance of medical care due to social distancing, underdiagnosis of STEMI, and fear of getting infected at the hospital. It is also likely that the interventional community and medical authorities failed to provide information to patients about appropriate cardiovascular care during the COVID-19 pandemic.

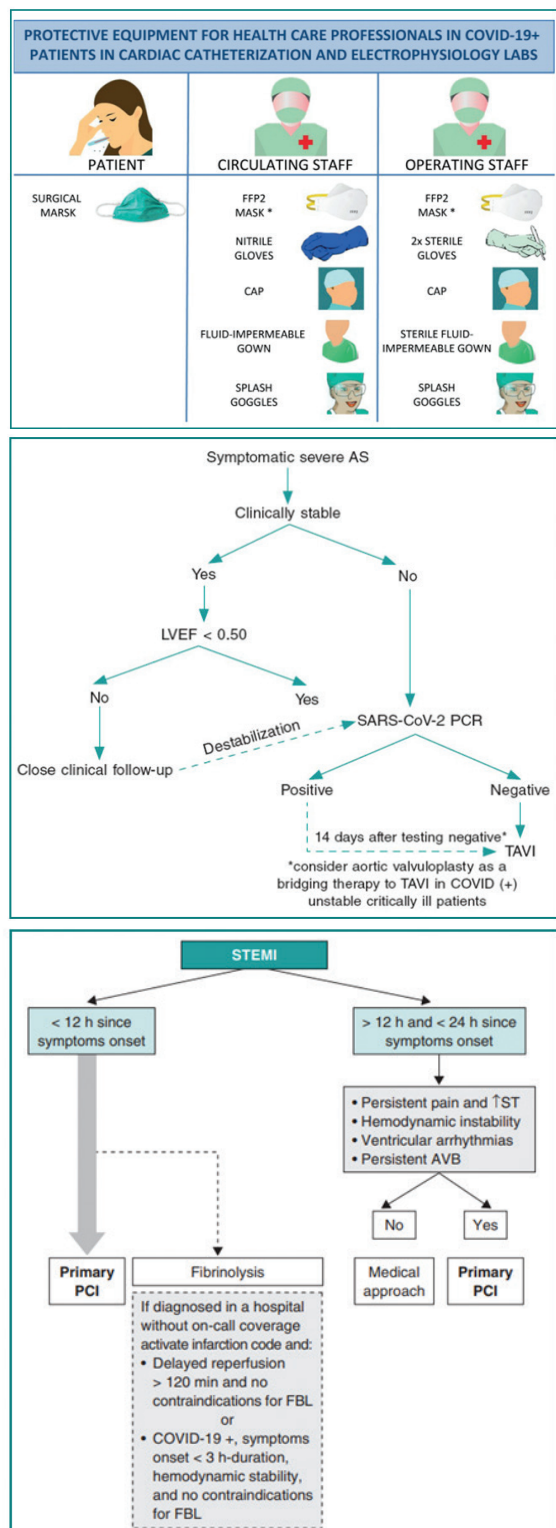


Figure 1. Consensus documents elaborated by the ACI-SEC addressing issues related to COVID-19 in interventional cardiology activities. AS, aortic stenosis; AVB, atrioventricular block; FBL, fibrinolysis; LVEF, left ventricular ejection fraction. Reprinted with author and publisher permission.⁶⁻⁸

WHAT WAS DONE RIGHT

Hospitals very quickly adapted to the high number of COVID-19–positive patients needing hospitalization and admission to an intensive care unit (ICU). Different areas of the hospital were transformed into ICUs, and new hospitals were even built from scratch specifically to treat COVID-19 patients, sometimes with military help. Such was the case of IFEMA, a large fair pavilion in Madrid that alleviated the pressure on hospitals in the city.

PPE use was mandatory and generalized in all hospital areas and health care facilities. Patients who had not been tested but were presumed to be COVID-19 positive were managed using extreme PPE protocols, assuming a positive result.

Our hospitals were functionally and physically divided into COVID-19 and COVID-19–free areas and circuits. In cardiology, protocols related to invasive procedures were also quickly adapted to the situation (ie, very few available hospital beds, the possibility of infected patients being admitted to the hospital). Elective procedures were canceled or postponed, and indications were more restrictive in some nonelective patients, such as those with low-risk non–ST-segment elevation acute coronary syndromes.

The treatment of unstable patients was maintained with the same indications that existed before the pandemic, with the aforementioned consideration for patients with non–ST-segment elevation acute coronary syndromes deemed at low risk. In the case of STEMI, primary percutaneous coronary intervention (PCI) was maintained as the default reperfusion strategy, and STEMI networks were maintained. For STEMI specifically, fast PCR test processing (< 1 hour) was available in some centers.

The Interventional Cardiology Association of the Spanish Society of Cardiology (ACI-SEC) released very early documents that included recommendations related to protection against the infection, organization of cath labs, and indications for invasive procedures during the pandemic.⁶⁻⁸ The authors of this article—Raul Moreno, ACI-SEC President; Ignacio Cruz, ACI-SEC President-Elect; Rafael Romaguera, member of the steering board; and Jose M. de la Torre Hernandez, Editor-in-Chief of *REC: Interventional Cardiology*—along with other members of the ACI-SEC, were committed to disseminating as much information as possible about the pandemic and its implications on our professional activity (Figure 1).⁶⁻⁹ The ACI-SEC conducted a very early study that detected an important reduction in the number of STEMI patients arriving to the hospitals during the pandemic; as a result, recommendations were issued to the population that patients seek medical assistance if they were experiencing chest pain (Figure 2).^{2,9}

CHANGES MADE AT THE HOSPITAL

The majority of patients without COVID-19 were discharged according to safe criteria, and many hospital wards were transformed into COVID-19–only wards. The emergency room was

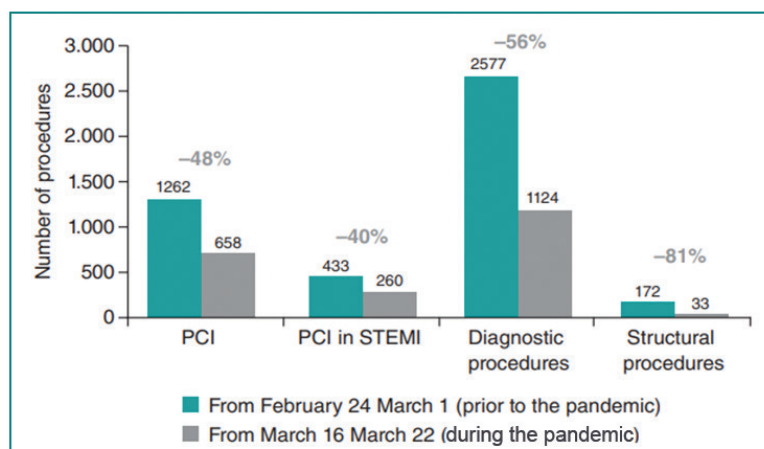


Figure 2. Changes experienced in Spain in interventional cardiology activity during the COVID-19 outbreak. Reprinted with author and publisher permissions.²

dedicated almost solely to receiving patients with suspected COVID-19 infection. A separate room was maintained to receive the rest of the patients.

Because cardiac surgery was nearly halted and the number of patients with acute cardiac conditions was reduced, part of the acute cardiac care unit was used for ICU beds. All elective procedures and interventions were canceled or postponed, and interventional cardiology activity was focused on treating emergencies and unstable/high-risk patients.

The interventional cardiology team was divided into two to three smaller teams for shift work, as were many other teams in the hospital. Outpatient visits were transformed into telemedicine care (mainly telephone visits). Mobility at the hospital was very restricted; family visits were not permitted, and surgical masks were mandatory.

Because the number of patients admitted with cardiovascular diseases was very low and there was a need to care for patients with COVID-19, many physicians and nurses from the cardiology department were moved to the COVID-19 wards.

REOPENING THE HOSPITAL

It was essential to create a multidisciplinary commission for the transition phase, with the ability to adapt to the restrictive measures depending on the epidemiologic situation. The hospital, and specifically the interventional cardiology department, only started to return to normal activity when the percentage of COVID-19 patients admitted to the hospital was clearly reduced, with different levels of activity based on that number (Table 1).

Separate circuits and hospitalization beds for patients with COVID-19 were created. On levels I to II (see Table 1), specific lab cleaning protocols and procedures for contact and drip isolation may be acceptable.

The risk of health care workers as a source of infection had to be controlled,

including early detection of SARS-CoV-2 infection and isolation measures. Personnel that had been moved to COVID-19 areas progressively went back to their departments after being deemed clear of infection.

The number of patients with acute cardiovascular events arriving to the hospitals progressively increased. In a few weeks, the number of these patients had recovered to the expected for the season.

After the acute phase of pandemic, elective procedures were not scheduled for a few weeks, even when hospital beds were available, due to concern about an infection rebound. The hospital preferred to be prepared for an early second wave. Once the cardiology department was returned to a relative normality, elective procedures began to be scheduled. The first were coronary procedures and transcatheter aortic valve implantations (TAVIs).

It is of remarkable importance that heart team decision-making meetings are maintained, at least for left main or multivessel disease and structural cases. However, heart team and other meetings should be performed online/remotely. For levels I to II, on-site heart team meetings

TABLE 1. INTERVENTIONAL PROCEDURE PRIORITIZATION ACCORDING TO AVAILABLE PROCEDURES AT THE HOSPITAL

Level	I	II	III	IV	V
% of beds occupied by COVID-19	< 5%	5%-25%	25%-50%	50%-75%	> 75%
Interventional activity	Normal activity	Nearly normal activity	All ACS; also elective procedures that cannot be delayed > 3 mo	STEMI and NSTEMI	Only STEMI and life-threatening cases
Abbreviations: ACS, acute coronary syndromes; NSTEMI, non-ST-segment elevation myocardial infarction; STEMI, ST-segment elevation myocardial infarction.					

should maintain > 1.5-meter distancing and require surgical masks.

In order for all activity to be safely re-established, we require a SARS-CoV-2 test to identify infected patients before any intervention is performed, except for emergency procedures.

Suspected COVID-19 is ruled out by PCR before any elective interventional procedure. For urgent procedures, fast PCR is performed before admission and full PPE is worn. When the percentage of COVID-19 beds is low, local incidence is low (< 5 cases a week), and the procedure does not include transoral procedures such as transesophageal echocardiography, PCR can be substituted with temperature and symptom checking before the procedure.

SIGNS OF A SECOND WAVE?

In Spain, confinement measures have been very effective at minimizing virus transmission, and there have been no signs of a second wave other than small outbreaks (< 100 cases) in a few counties. In these cases, isolation measures and de-escalation of the transition phase have been able to limit the outbreak.

Some patients require admission due to late complications of COVID-19, but the number of newly infected patients being admitted to the hospitals is now extremely low. For the moment, we do not have signs of a second wave. The official confinement has been progressively relaxed and, with the relative normalization of social life, all of us are committed to remaining cautious. Spain is a major tourist destination for people from all over the world, so it is crucial to establish controls in the main arrival points, such as airports and ports.

PREPARING FOR A SECOND WAVE

The public health authorities at both the national and regional levels have established close monitoring of new cases across the country and are now more ready to take measures immediately after any signal of a resurgence.

The following are some key takeaways and recommendations for preparing for a possible second wave.

- Maintain the multidisciplinary commission at the hospital level.
- Be prepared to oversize your hospital's critical care capabilities, at least to 1.5 to 2 beds/10,000 population.
- Know how to protect patients and yourselves and organize the hospital and cath lab.
- Enhance testing capability for asymptomatic patients/workers and close contacts.
- Promote the use of telemedicine for patient follow-up.
- Ensure that patients are tested before invasive procedures, except for those undergoing primary PCI (testing is available afterward).

- Question all patients for COVID-19 symptoms, ensure that they wear surgical masks during the entire hospital stay, and minimize delay times.
- Require PPE use by operators as standard of care in cath labs.

"It is the enemy you underestimate who kills you." —

Robert Jordan

Stay safe! ■

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