





# Preparation, escalation, de-escalation, and normal activities

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## Abstract

Iran is one of the earliest countries involved with coronavirus disease 2019 (COVID-19) pandemic. In the present short report, we have presented our experiences as a cardiovascular tertiary center during the COVID-19 outbreak. At the beginning, we have pursued our activities in four field of administrative, preventative, therapeutic, and research. Then by gaining new experiences, we have tailored our strategies. Finally, we have described our challenges and future strategies on returning to normal activities.

## KEYWORDS

cardiovascular diseases, COVID-19, pandemic

Iran had the misfortune of being among the first countries to be affected by coronavirus disease 2019 (COVID-19).<sup>1</sup> The first cases were officially reported at the end of February 2020, since which time, more than 350,000 individuals have been infected, with 305,000 patients having recovered and more than 20,000 having expired.<sup>1</sup> Rajaie Cardiovascular Medical and Research Center (RCMRC) is the largest cardiovascular center and one of the most active academic centers in Iran. With more than 600 beds, RCMRC has a daily emergency department admission rate of 200 patients.

In keeping with Iran's strategy of the noninvolvement of non-pulmonary disease tertiary subspecialty centers in the current pandemic, RCMRC was not designated to primarily admit patients with COVID-19 and was tasked to play its role as a referral hub. Nevertheless, our center cannot practically disengage itself from COVID-19 given the considerable overlap between the respiratory symptoms of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and cardiovascular disease (CVD),<sup>2</sup> particularly at a juncture when patients suffering from CVD constitute the most affected population with the highest mortality.<sup>3,4</sup>

## 1 | PREPARATION

A COVID-19 task force was formed in the early days of the pandemic by the RCMRC's senior staff to pursue four fields of activity: administrative, preventative, therapeutic, and research.

The administrative committee is tasked to postpone elective surgical and nonsurgical procedures as well as routine consultation clinics, allocate resources, and funds required for the pandemic situation, close selected wards to better focus on the newly devised strategies, assign a unit with isolation facilities for hospitalized patients suffering from CVD with diagnosed or suspected COVID-19, distinguish the high-risk population among the staff members and grant them paid furlough, provide onsite and online hotlines through which patients can receive information about the hospital's policies, and furnish further web-based services to patients.

SARS-CoV-2 is highly contagious, even from the asymptomatic population, and a large portion of nosocomial transmissions occur through contacts between clinicians and visitors with no or mild symptoms of COVID-19.<sup>5</sup> The prevention committee has, therefore, been commissioned to provide the entire staff with the necessary

personal protective equipment (PPE). Given the global shortages of PPE in the early days of the pandemic, the prevention committee sought to prioritize healthcare providers at a higher risk of infection by defining different levels of protection. To that end, the committee established isolation wards and procedural rooms (e.g., an isolated catheterization laboratory and an isolated operating room) for infected patients.

The therapeutic committee, composed of cardiologists, cardiovascular surgeons, pulmonologists, and infectious disease specialists, reviews the latest national and international guidelines vis-à-vis the treatment of COVID-19 on a daily basis and seeks to apply them in various settings.

The research committee plays 2 major roles: providing scientific statements and guidelines on CVD based on the needs of the community or hospital and designing COVID-19 related research.<sup>6-9</sup> The global goodwill for helping the ongoing battle against the COVID-19 pandemic has created an unprecedented enthusiasm in the international scientific community to share scientific evidence. The Research Committee evaluates research proposals, validating their scientific significance, and also their compatibility with ethical measures. Normally, all research proposals in our center are presented to institutional research committees, the members of which decide whether to approve or to reject them. For the purposes of the COVID-19 era, RCMRC has established an exclusive online research committee for fast-track proposal evaluation.

In light of its position as the leading center for CVD, RCMRC has also been involved in devising different national guidelines concerning the new pandemic. These documents are concentrated not only on the management of different medical states in the COVID-19 era such as that of ST-segment-elevation myocardial infarction (STEMI)<sup>6</sup> or cardiopulmonary resuscitation<sup>8</sup> but also on the statements of heart societies, such as the Iranian Society of Cardiovascular Surgeons<sup>9</sup> and the Iranian Society of Echocardiography<sup>7</sup> regarding the current status of their activities in the pandemic era. The center has also issued specific protocols to address the risk of potential adverse events caused by drug-drug interactions between various antiviral agents and prevention medications (e.g., hydroxychloroquine) in patients with CVD.

Although we have witnessed a decrease in our ED admission, we are also facing shortage of the resources. Consequently, risk stratification and prioritization of the patients plays an important role during this especial period. Dyspnea is currently the most common symptom of the respiratory infection and unfortunately, has a significant overlap with CVD presentation. Thus, a number of ongoing research projects are conducted to evaluate the discriminative value of the routine risk scores (e.g., HEART score in acute coronary syndrome and GENEVA score in pulmonary emboli) in the COVID-19 era.

COVID-19 pandemic has also had a remarkable impact on medical education. An ongoing research is focusing on this matter. We have tried initially to quantify the problem and to evaluate the scope of the problem and then finding practical solution.

Finally, the considerable impact of the COVID-19 on the ongoing research projects should be noted. Patients recruitment and follow ups were severely impaired due to the cancelation of elective workups and also patients' fear to seek medical care. Consequently we were forced to temporarily suspend or permanently stop a substantial proportion of the studies.

## 2 | ESCALATION OR DE-ESCALATION

The strategies adopted by RCMRC are subject to escalation or de-escalation with a view to reflecting the new experiences gained on a global level. Indeed, our strategies are modified on an almost daily basis to accommodate the new evidence shared by the international scientific community. An example of strategy escalation in RCMRC is our stance in regard to the prophylaxis of venous thromboembolism (VTE). The early reports from China indicated thrombocytopenia as one of the features of COVID-19 and, thus, created a fear of bleeding complications.<sup>10</sup> Nonetheless, later on, both thrombocytopenia and bleeding were proven to be uncommon, while VTE was reported to be an important complication in patients hospitalized for COVID-19. Consequently, VTE prophylaxis is now deemed the cornerstone of therapy in such patients.<sup>11</sup>

A salient lesson emerging from the current pandemic is the significance of unbiasedness among the scientific community and the flexibility in preventive care and treatment protocols. By way of example, the national protocol on the management of STEMI during the COVID-19 era has prioritized thrombolytic therapy over primary percutaneous coronary intervention (PCI), primarily out of concern for the safety of the medical staff involved in the latter procedure.<sup>6</sup> We have, however, learned over time that with appropriate screening and PPE, primary PCI can be provided to patients with STEMI.

Indubitably, the availability of resources exerts a meaningful impact on the escalation or de-escalation of strategies. A case in point is our limitations in availing ourselves to the polymerase chain reaction test for the detection of COVID-19 in the early days of the pandemic, obligating us to base our COVID-19 triage on lung computed tomography scan results. In accordance with the Radiological Society of North America expert consensus on COVID-19, patients admitted to RCMRC were categorized as typical, indeterminate, atypical, and negative, and those with the typical or indeterminate radiological features of COVID-19 were isolated to receive treatment at the discretion of our infectious disease specialists.<sup>12</sup>

## 3 | NORMAL ACTIVITIES

By the time of writing this paper, Iran alone has reported over 100,000 cases of COVID-19, with an expected peak of cases being projected for mid-April to -June. Epidemiological data from across the world suggest that the second wave of COVID-19 is in all probability inescapable. The outbreak of COVID-19 drastically affected CVD management in a matter of months. It is well-nigh impossible to envisage a return to normal activities after this pandemic, which is why the delivery of optimal care to patients with CVD in the post-COVID-19 era requires the definition of a new framework. On the other hand, despite the decrease in the prevalence rates of this infection by comparison with recent months, a delay in the careful resumption of normal hospital activities may result in another catastrophe with high mortality rates.

What has expedited efforts by various healthcare systems to take the first steps toward formulating a new framework is the rapid transmissibility of COVID-19. For instance, RCMRC and some of its

Iranian referral counterparts have witnessed a dramatic drop in the number of adult cardiac surgery procedures since the implementation of the national policy to concentrate healthcare resources into critical care units. In line with the national guidelines, our center's mission is to facilitate the referral of emergent and urgent cases from the centers designated for patients with COVID-19. Now that our country has experienced the flattening of the COVID-19 prevalence curve (2 weeks before the writing of this paper), the debate on the resumption of nonurgent healthcare delivery has intensified, not least because of the risk to patients whose cardiac surgical procedures are delayed. In excess of 4000 cardiac surgical procedures are performed in RCMRC per annum; the decision concerning how long such procedures should be postponed is indeed a daunting task. The administrative committee of RCMRC has already formulated a protocol paving the way for the swift resumption of the center's normal activities. The protocol centers on the composition of a waiting list and a triage mechanism commensurate with the volume of postponed procedures with a view to clearing the backlog created by the pandemic surge. It is estimated that the mortality rate while waiting for aortic valve replacement is 3.7% and 11.6% at 1 and 6 months, respectively.<sup>13</sup> For patients on the coronary bypass waiting list, the rate is 2.6% per month with a monthly increasing risk of 11%.<sup>14</sup> To resume the normal activities of the center, the administrative committee of RCMRC in collaboration with faculty members from all departments has prepared a checklist and a road map aimed at meeting the following demands: (1) augmenting the intensive care unit capacity, (2) minimizing operating room cancellations, (3) shortening the length of hospital stay, (4) providing adequate PPE, and (5) enhancing the prioritization and scheduling of cases. We believe that in a dedicated cardiovascular center, such as RCMRC, it is feasible, albeit complicated, to efficiently tackle the logjam caused by postponed procedures in the recent pandemic surge with a meticulously-thought-out plan. Since the beginning of May 2020, RCMRC has provided routine care to high-priority cases including patients in need of therapeutic procedures (Classes I and IIa of the recommendations) and patients to whom delayed procedures may be harmful at the discretion of its physicians in accordance with the latest guidelines. For example, amongst patients on the waiting list for coronary revascularization, we initially accorded priority to symptomatic non-emergent cases with a high degree of stenosis before lowering the admission threshold to our normal and routine level. Now, RCMRC admits all elective cases with the proviso that they undergo routine preoperative infectious disease evaluations so that COVID-19-negative cases can receive routine medical, surgical, or interventional care.

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