

COVID-19: A Perspective from Iran

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic has presented unique challenges to international health care systems. Management of the current pandemic puts a huge strain on health care sectors and leads to new strategies conducting by health care systems in countries across the world. In the present article, we review the epidemiologic data, Iranian health care system response, as well as the effects of COVID-19 pandemic on cardiac surgery practice in Iran

Introduction:

The global pandemic caused by a novel coronavirus, termed “severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)”, emerged in Hubei province in China in December 2019. Follow on to this, the first official announcement of a diagnosed patient with coronavirus disease 2019 (COVID-19) in Iran was made on February 19, 2020. (1). As of June 26, a total of 2 020 217 724 diagnosed patients had been confirmed via laboratory assessments, and 177 852 patients had recovered or had been discharged from hospitals. This surely stretched thin the provision of healthcare on different healthcare sectors including cardiovascular surgery. The impact of this is still evolving despite resuming limited capacity to provide service to our cohort at large. The actual after-math from this has not been concluded. Hence, in this review we will reflect on the restructuring the pandemic virus has afflicted and its virulence on multilayered in our healthcare system.

How Iran Has Approached the Pandemic:

According to a recent census in 2020, the estimated population of Iran was 83 992 949 . (2) The Iranian Ministry of Health and Medical Education (MoHME), conducted almost 1,557,872 polymerase chain reaction (PCR) tests. 19.2 PCR tests per 1000 people have been performed since the beginning of the pandemic in Iran. The relative comparisons of the cumulative number of tests performed per 1000 people in the region is demonstrated in figure1. By June 29, 2020, more than 10 000 PCR-confirmed deaths had been recorded among patients with COVID-19; accordingly, 2593 and 122 people per 1,000,000 people were infected and subsequently died from COVID-19, respectively. The highest number of newly diagnosed patients was recorded on March 30, 2020 (3186 patients), and a declining slope was observed consequently.

By in large, many infected patients remained undiagnosed up until the date of the first official report, which dated February 19, 2020., This was due to lack of awareness of the viral virulence, proper diagnostic measures, and insufficient warnings. Indeed, some physicians and specialists around the country have been on record as stating that they encountered a series of patients with presentations of pneumonia and computed tomography (CT) scan findings similar to those in patients with COVID-19 which were stated prior to official reports. Retrospective evaluations of the CT scans or body fluids from those patients, if available, would have helped to clarify the real figures. Nonetheless, this diagnostic negligence prior to the declaration of the

World Health Organization (WHO) concerning “global pandemic warnings” is similar scenario across the world.

The abovementioned data should be interpreted in light of the following points:

1. After the first surge of the pandemic, the government not only banned public and religious events but also closed schools, universities, shopping centers, bazaars, and holy shrines. Serendipitously, the 2-week Iranian New year’s (Nowruz) holidays, which start on the first day of spring, fell within the period of the restrictions of social activities, allowing policymakers more time to contain the spread of the virus and to avail the impact of this pandemic.
2. The shortage of laboratory diagnostics in the early period of the outbreak delayed the testing of COVID-19 extensively, compelling physicians to deal with patients with suspected infection by relying merely on physical examinations or chest CT scans, which were accessible across the nation. As is illustrated in Figure 1, Saudi Arabia and Turkey performed 45.7 and 39.5 tests per 1000 people, respectively, in comparison to 19.2 tests per 1000 people in Iran. Hence, the actual number of patients with COVID-19 may have been underestimated in Iran.
3. As is the case of other countries, it appears that a majority of infected individuals are either asymptomatic or mildly symptomatic and have not been referred to hospitals and labs by frontline physicians. Therefore, the daily figures of diagnosed patients must have been underestimated and fatality rate may have been overestimated, consequently.
4. The negative economic impact caused by the spread of COVID-19 in Iran coincides with the highest ever politically motivated economic sanctions against the country by the United States government. (3) The Iranian health sector, albeit among the most resilient in the region, has been affected because of the sanctions.
5. On the basis of recent statistics, inpatient healthcare services in Iran are now provided by more than 900 hospitals nationwide, almost 85% of which are public hospitals under insurance coverage. (4) This number approximately equals 117 000 hospital beds, producing a density of 1.62 beds per 1000 people among the Iranian population. Hence, COVID 19 cases are being dealt on priority.

The Impact:

In the early stage of the pandemic, the MoHME announced that all public and private hospitals should cancel elective procedures and elective admissions from February 29, 2020. In conjunction with the decree for the postponement of elective procedures, each faculty and hospital were tasked to set up scientific and executive multidisciplinary committees. Additionally, all hospitals and clinics, except single-specialty tertiary centers, were to admit patients with COVID-19 including those requiring admission to general units or intensive care units (ICU).

Thanks to a nationwide network that was implemented decades earlier and was comprised of a referral system starting at primary care centers in the periphery going through secondary-level hospitals in the provincial capitals and tertiary hospitals in major cities, the healthcare system was able to resorb the increasing emergence of COVID-19 cases and provide primary response to the current crisis.

With the exponential rise in the number of patients affected, internists, hematologists, nephrologists, general surgeons, and thoracic surgeons joined the multidisciplinary framework. Cardiac surgeons were also involved in the implementation of extracorporeal membrane oxygenation (ECMO). These initial actions, accompanied by the restrictions laid down by the government, led to a steady-state curve of newly diagnosed patients in March 2020.

Domestic pharmaceutical and medical device companies accelerated the manufacturing of personal protective equipment (PPE), drugs, diagnostic kits, and essential supplies to overcome major shortages as a consequence of the international sanctions against Iran in the past years.

Currently, all hospitals providing care to patients with COVID-19 are equipped with PPE for healthcare personnel.

Cardiac Surgery Amid COVID-19:

In the early stages of the COVID-19 pandemic in Iran, general hospitals provided healthcare services to patients; nevertheless, the drastic rise in the number of infected cases in March 2020 resulted in the overwhelming referral for COVID-19 infected cases to tertiary centers as well. The additional strain on healthcare sectors rapidly led to the curtailment of elective cardiac and noncardiac surgeries in the lockdown period. The decline in the volume of elective cardiac surgeries was palpable given that a considerable portion of such surgical patients needed postoperative ICU care. Procedures were, thus, limited to emergent and urgent scenarios, and even the number of patients with aortic dissections and left main coronary artery lesions admitted to cardiac surgery wards dropped significantly compared with a similar period last year.

The Iranian Society of Cardiac Surgeons published a statement in response to the postponement of elective cardiac procedures. (5) which described multiple situations for patients with or without positive tests for COVID-19. In patients with positive COVID-19 tests requiring urgent or emergent cardiac surgeries, the decision to perform surgeries should be based on the prognosis of the current disease and the underlying comorbidities (Fig. 2). Moreover, the recommendations of the COVID-19 team, consisting of cardiovascular surgeons, cardiologists, cardiac anesthesiologists, intensive care specialists, infectious disease specialists, and pulmonologists, should be considered in the process. For patients not infected with COVID-19, it is generally recommended that cardiac surgeries be performed in tertiary cardiovascular centers such as Rajaie Cardiovascular Medical and Research Center rather than in general hospitals, which were directly involved with COVID-19 care.

Acute aortic dissection, mechanical heart valve thrombosis, and acute coronary syndrome (especially with the left main disease) are considered in need of prompt treatment even during the COVID-19 pandemic. However, given the uncertainty in the future regarding fatalities of disease, drawing a line to divide patients into specific categories is impossible. As highlighted by other researchers, there is a need for new clinical decision making processes and frameworks that help guide patients to the appropriate treatment strategies (6).

Healthcare providers constitute any country's lynchpins of protection in the face of calamities such as viral outbreaks, and their health and safety are crucial both for efficient patient care and for disease control. Previous experiences with severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks demonstrated that healthcare providers were under extraordinary stress and susceptible to infection. (7) The number of infected healthcare personnel is a reasonable index of the adequacy of PPE and the extent of healthcare environment exhaustion. According to an unofficial report released on June 25, 2020, approximately 2000 healthcare workers were diagnosed with COVID-19, with the number projected to reach 5000 by the time the outbreak has been curbed. Only in the first 2 months of the outbreak, around 110 healthcare providers, particularly general physicians, died after COVID-19 infection.

ECMO Services During the COVID-19 Outbreak:

The actual number of patients with COVID-19 who might present with severe acute respiratory distress syndrome (ARDS) refractory to maximum medical treatment is unknown to a large extent. The WHO interim guidelines (8) for the management of patients suspected of COVID-19 infection recommend administering ECMO when such patients present with severe ARDS in expert centers with sufficient case volumes. Experience as regards previous emerging infectious outbreaks is evidence that further supports the efficacy of ECMO in the current evolving pandemic. (9) ECMO services should be provided in well-equipped centers with sufficient experience and dedicated multidisciplinary teams specially trained for the management of patients requiring ECMO. There are no published data on experience with ECMO in patients with COVID-19 in Iran; be that as it may, Masih Daneshvari Medical and Research Center, the main referral center in the COVID-19 pandemic, has invaluable experiences in this regard. From March 1, 2020 to May 8, 2020, ECMO was utilized for 7 patients by that center. Three of these patients were weaned from ECMO successfully, but only 1 patient was discharged from the hospital in a stable condition. The remaining 3 patients had clot formation in the oxygenator, and it appears that a higher dose of heparin should be administered to

achieve an activated clotting time of more than 250 seconds. Regrettably, only a few centers in Iran can provide ECMO services; the majority of cardiovascular centers are devoid of not only ECMO devices but also oxygenators and cannulae because large pharmaceutical companies have been forced out of Iran's market by the economic sanctions imposed on the country.

Conclusion:

the relatively large number of healthcare providers affected with COVID-19 indicates the deficiencies in protective measures utilized in hospitals and the need for their reassessment. Patients with cardiovascular diseases are potentially at high risk of death, not least if necessary, interventions are delayed. To avoid this life-threatening situation in this high-risk population, we suggest that tertiary cardiovascular centers or at least 1 hospital in every large city be kept COVID-19-free. We also recommend clear-cut and constantly updated interim guidelines on the management of cardiovascular diseases such as valvular, thoracic, aortic, and ischemic diseases vis-à-vis priorities, the utilization of less invasive approaches, and the postponement of elective procedures

Authors' contribution:

ZHM, MB and SH: Concept and design; MM and AN: drafting article and Critical revision of article; SH and MB: Approval of article.

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Figure legend:

Figure 1: Total COVID-19 tests per 1 000 people, June 29, 2020 (Source: <https://ourworldindata.org>)

Figure 2: Daily confirmed COVID-19 deaths in Iran, from February 20 to June 28, 2020. (Source: European Centre for Disease Prevention and Control; the chart is available at: <https://ourworldindata.org>)

Figure 3: Algorithm for the management of patients undergoing cardiac surgeries during the COVID-19 outbreak (Source: <https://sites.kowsarpub.com/mca/articles/104296.html>) ; GDMT, Guideline-directed

medical therapy

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