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# Cardiac Surgery Services During the COVID-19 Outbreak: Surgeons' Thoughts

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## Abstract

Cardiac surgeons during this pandemic crisis have a responsibility to ensure that essential elective cardiac operations are provided at their centers to the public, at the same time, they have to face administrative demands as well as the infection prevention guidelines and restrictions to protect themselves and their patients. Here, we describe the patient and procedures characteristics that we recommend to protect our patients and the healthcare workers.

**Keywords:** COVID-19, Cardiac surgery, Healthcare workers

## 1. Introduction

A Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) outbreak has declared a public health emergency of international concern by the WHO since January 2020. On March 2nd, 2020, the Ministry of Health in Saudi Arabia confirmed the first case of COVID-19 disease caused by the SARS-CoV-2 virus in the Saudi Arabia Kingdom [1,2]. As of April 10th, 2020, the Kingdom had almost 5000 confirmed cases [3,4]. The rapid, exponential increase in confirmed cases makes the prevention and control of coronavirus disease (COVID-19) extremely challenging. The clinical manifestations of COVID-19 are mainly respiratory; however, some patients may present with non-specific cardiac manifestation [3]. Furthermore, the issue which becomes the focus of the constant debate is what we shall do with the cardiac surgical patients on the waiting list?

So what is the impact of COVID-19 disease outbreak on cardiac surgery? Cardiac surgery practice is not a business as usual. This unprecedented crisis affects cardiac surgery units in many ways. It limits intensive care unit (ICU) beds and ventilation sites; a necessity to postpone elective and/or complex cardiac surgeries; shortage of healthcare workers and sick healthcare staff. It has also impacted the clinical meetings (e.g., limiting the number of attendees in heart-team meetings); were necessary decisions taken for patients on the waiting list and in house patients. However, we do still have the moral, and responsibility obligation, to ensure that the essential cardiac services are provided to the general public to the best of our knowledge. At the same time, the broader burden of those procedures on the healthcare system and healthcare workers must be minimized in times of COVID-19.

## 2. Which Cardiac Operations Should Perform?

The COVID-19 pandemic puts health services in Saudi Arabia and all over the world under escalating pressure with an increasing number of

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infected individuals. While decisions on whether or not to perform cardiac surgery will be more comfortable in the early phase of the pandemic, when ICU beds are still available, However, continued escalation of the pandemic, will make decisions on having surgery more difficult. The question which put itself, shall we stop all the elective cases, and for how long? If not, which group of patients should be offered the surgical care, while taking the full consideration of protecting the patient and the staff from the spread of COVID-19 virus.

Following the WHO declaration, the Kingdom of Saudi Arabia proclaimed a formal advisory to cancel elective surgeries throughout the Kingdom. The concerns were elective procedures might contribute to the spreading of the COVID-19 virus within the healthcare facilities [4]. The patient can both spread but also be infected by staff or other patients. S transmission is both ways. The lack of the clear directive on how to prioritize and maintain the cardiac surgery services to our patients, the American College of Surgeons (ACS) issued their recommendation regarding the prioritizations of the elective cardiac surgery as below:

The ACS bulletin stated the following specific recommendations [7]. “Each hospital, health system, and surgeon should thoughtfully review all scheduled elective procedures with a plan to minimize, postpone, or cancel electively scheduled operations, endoscopies, or other invasive procedures until we have passed the predicted inflection point in the exposure graph and can be confident that our health care infrastructure can support a potentially rapid and overwhelming uptick in critical patient care needs.”

### 2.1. Emergency and in-house urgent cardiac surgery, on whom should we operate?

There is no doubt and no disagreement within the international cardiac surgical communities that patients who present or in-hospital with cardiac pathology, which necessitates emergency intervention, will undergo surgery. Patients with acute type A aortic dissection, acute heart failure due to a severe coronary artery or valvular heart disease, and patients with the acute coronary syndrome in case of severe coronary artery disease (e.g., severe left main trunk stenosis, severe triple vessel disease with high SYNTAX score) who are not eligible for conservative or interventional treatment should be operated on. This may be true also for younger patients with symptomatic severe aortic valve stenosis, left-sided endocarditis with a severe valve defect and/or large

mobile vegetation, large ascending aortic aneurysm (>6 cm in diameter), in whom the delay of the surgery will have significant morbidity and mortality. Fig. 1.

### 2.2. Elective patients: how should we manage their care?

One must realize that cardiac surgery units have a responsibility to the patient, but also the healthcare workers and the broader health care service in a region/country. Until the pandemic situation is brought under control, patients with elective cardiac procedures should be postponed for a few weeks to minimize their exposure to the hospital environment. Patients with cardiac illness contracted COVID-19 often have a poor prognosis [5]. Therefore, developing COVID-19 after cardiac surgery will associate high mortality. The cardiac center should provide pathways of care and telecommunication, were patients on the waiting list for elective cardiac surgery will have access to their doctors. The patients will be reassured, and their medications should be prescribed. In the case of a patient on the waiting list is deteriorated, early recognition is encouraged. Patients will have the direct access to their doctors and the cardiac clinic coordinators through the virtual clinic, to report any deterioration in their health related to their cardiac condition. Arrangement will be done to be admitted to the hospital after COVID-19 testing. Fig. 1.

### 2.3. COVID19 disease and the use of ECMO

The Initiation of Extra Corporeal Membrane Oxygenation (ECMO) for the COVID-19 patients with severe respiratory failure may result in decreases in lymphocyte numbers and immunity function, which can be associated with increased severity of COVID-19. A report published online in The Lancet Respiratory Medicine Journal by Dr. Brandon M. Henry from Cincinnati Children's Hospital Medical centre in Ohio urges caution when using ECMO in patients with COVID-19, especially in the face of lymphopenia [6]. Ruan et al. reported significantly higher interleukin-6 concentrations in COVID-19 non-survivors compared with survivors. Elevated IL-6 levels in the lung induced by ECMO inversely correlated with survival in children and adults [7]. Brandon et al. performed a pooled analysis of the early reports of the use of ECMO in Acute Respiratory Distress Syndrome (ARDS) due to coronavirus disease when compared to the Middle East Respiratory Syndrome -Related Coronavirus (MERS-CoV) patients receiving ECMO. The

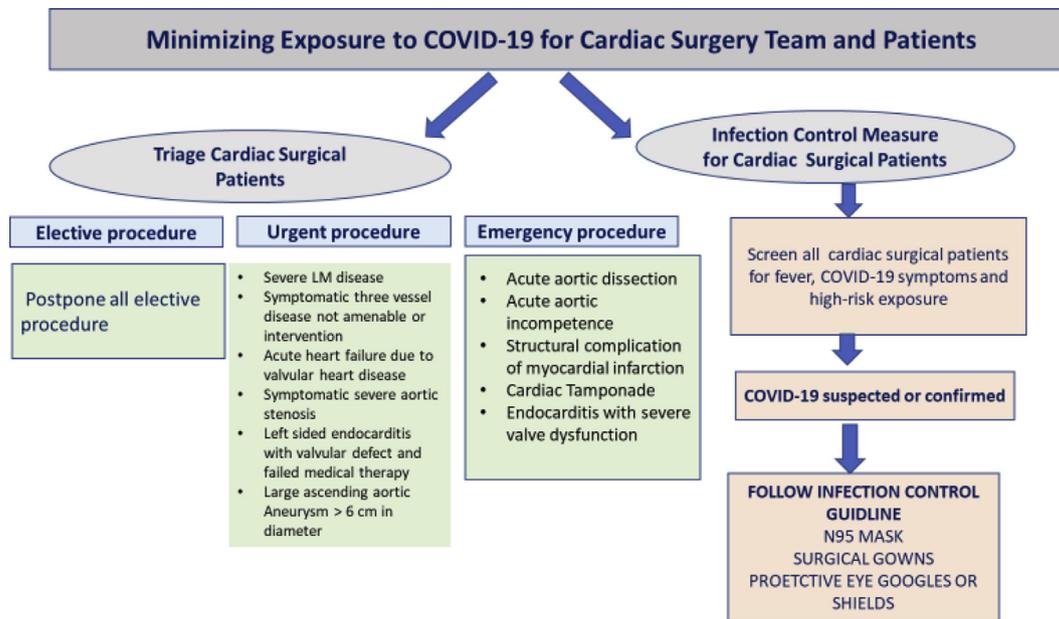


Fig. 1. Minimizing exposure to COVID-19 teams and patients.

COVID-19 patients seem to have substantially higher mortality (94.1% vs. 65.0%) [8,9]. Therefore based on the available data, the benefit of ECMO in this group of patients is very doubtful. Given the limited benefits and higher risk of virus transmission to the healthcare staff, we should not support the use of ECMO for the COVID-19 ARDS patients.

### 3. How to Protect Healthcare Workers and Patients?

The Kingdom of Saudi Arabia Ministry of Health and Ministry of the national guard, issued awareness guidelines on March 17th, 2020 to protect the public. However, the healthcare workers among the highest risk groups of contracting infection with COVID-19 [10].

My personal experience during the SARS outbreak in the Prince of Wales Hospital in Hong Kong, two of my colleagues, who are senior doctors, were among the first group contracted the SARS virus during the outbreak in the hospital [10,11]. Furthermore, our experience with the MERS-CoV, at two tertiary care hospitals in Saudi Arabia, three out of eleven ICU critically ill patients with MERS-CoVid- ARDS were healthcare workers. Precautions in the interactions between patients and healthcare workers are of high priority. Therefore, we put forward the following recommendation:

1. Staff management should arrange to separate health workers/surgeons into teams so that possible quarantines

will apply to one group within each division rather than the division as a whole, which would lead to the closure of the entire service.

2. COVID-19 is spreading by droplets and contact [2] and not principally an airborne. Therefore, the Center for Disease Control and Prevention (CDC) recommends the use of masks, gowns, pairs of gloves, during the contacts with all patients. However, The strict adherence to use all the protective water-impermeable gown, gloves, face mask (N95) and face shield are strongly recommended throughout the peri-operative period for the suspected and the confirmed cases of COVID-19, undergoing cardiac surgery.
3. Operative theatre doors should be closed at all times and a negative pressure rooms should be optimized. After surgery and before leaving, contaminated equipments must be left in the OR and discarded into a special container.
4. Healthcare workers must focus on meticulous hand hygiene, avoiding contaminating workspaces, and should clean workspaces and personal items frequently.

### 4. Conclusions

The COVID-19 pandemic puts cardiac surgery services all over the world under increasing pressure. Cardiac surgeons and associated healthcare staffs are confronted with a novel virus and disease could leads to considerable uncertainty. It is imperative to provide a clear direction and a decision making process on whether or not a cardiac surgery service should be provided. We have thoughtfully weighed the risk of delaying surgical care with the risk of exposing the patient to the hospital environment and the risk of developing COVID-19, and this in the context of a healthcare

system under extreme pressure. It should be recognized that healthcare workers are of high risk for exposing themselves to the COVID-19 virus and it puts healthcare workers and their family members at higher risk of infection. Hospitals must provide maximum protective equipment for healthcare workers to protect themselves. Patients can only be cared for if healthcare workers have peace of mind, stay safe and healthy.

### Conflicts of Interest

The authors declare that there is no conflict of interest.

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