Isolation Unit: A New Way to Practice at Heart Hospital, Qatar during the Corona Virus -2019 Pandemic

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ABSTRACT

Background: The novel coronavirus disease-2019 (COVID-19) spread rapidly around the world and was declared as the second pandemic of the 21st century. The first case was detected in Qatar on February 29, 2020. In order to protect patients and staff in Heart Hospital, the only tertiary cardiac center in Qatar, new measures were implemented to reduce the spread of infection in our hospital.

Methodology: A 13-bed high dependency isolation unit was allocated to receive cardiac patients with appreciate infection control measures. Another isolation unit was also established in coronary care unit for critical patients. All patients admitted to Heart Hospital were tested for COVID-19 on admission. Patients were transferred out of isolation, if result was negative. Patients with positive results were either transferred to a COVID facility before or after planned cardiac procedure depending on their cardiovascular disease risk.

Results: Six hundred and seven patients were admitted to both the isolation units, most of them were men (89%). Forty-four percent were diagnosed with ST elevation myocardial infarction, 22% were non-STEMI or unstable angina, 17% were decompensated heart failure, 7% were elective cases for coronary angiography or electrophysiology procedures, 8% for other diagnosis, and 1% for both cardiac arrest and post cardiac surgery. 85.2% of the patients admitted to isolation units were tested negative and transferred to normal wards to complete their treatment. Eighty percent of the patients tested positive or reactive for COVID-19 had epidemiological risk, 8.4% had suggestive symptoms, and 11.6% had abnormal chest X-ray.

Conclusion: This study demonstrated the importance of the isolation unit with infection control measures in controlling the transmission of COVID-19 in a hospital setting such as the Heart Hospital. Epidemiological risk factors including recent travel, close contact with suspected or confirmed cases within 14 days or less, living in shared accommodation or living in lockdown area were the main risk factors for spreading COVID-19 infection which can be managed by minimizing social activities.

Key words: Coronavirus disease-2019, isolation, polymerase chain reaction, ST elevation myocardial infarction

INTRODUCTION

Since the World Health Organization declared coronavirus disease-2019 (COVID-19) the second pandemic of the 21st century,[1-3] the
clinical practice and the way of how clinical staff approach their patients have changed dramatically to protect patients and health-care providers from the wide spread of COVID-19 infection. These changes affected the way medicine practiced across the globe, especially for people with preexisting chronic conditions including cardiovascular disease. The first case in Qatar was detected in February 29, 2020.

The Heart Hospital, a member of Hamad Medical Corporation (HMC) established in 2011, is the only tertiary cardiovascular disease center in Qatar. The Heart Hospital receives patients by direct transfer by ambulance service, personally presented to the Heart Hospital emergency room, or transferred from the main emergency room in Hamad General Hospital if they needed further cardiac care.

In order to prevent any catastrophic consequences of potential infection, the Heart Hospital administration implemented different strategies to minimize the infection risk. This report describes how we created a dedicated unit to receive cardiac patients with unknown COVID-19 status until the results of their tests were available. This review was approved by the Heart Hospital quality department and HMC medical research center.

**METHODOLOGY**

At the beginning of COVID-19 spread in Qatar in February 29, 2020, cardiac patients were used to be admitted to the respected wards in the Heart Hospital with droplet and contact isolation pending their COVID-19 test. Those patients were scattered across the whole inpatient wards which increased the risk of spreading infection at the Heart Hospital.

In order to mitigate the risk of transmission the Heart Hospital administration decided to create a special high-dependency isolation unit 1 (HDU-I) for COVID-19 suspected patients. The unit started on March 29, which consists of 13 single rooms with high-efficiency particulate air filter and private bathrooms and managed by well-trained cardiologists and nurses equipped with isolation personal protective equipment (PPE) and N95 masks.

Admission to the newly COVID-19 isolation unit is based on predefined criteria according to HMC communicable diseases center (CDC) guidelines. All patients required cardiac care were admitted to the newly 13-bed isolation unit where COVID tests performed and then patients were sent to regular telemetry bed when the test results confirmed negative.

Those with ST elevation myocardial infarction (STEMI) were admitted to the isolation unit after undergoing primary coronary angioplasty (PPCI) without any delay. Their COVID test was performed directly after the PPCI procedure. While waiting for the results of the COVID test, all patients were under the care of a cardiology attending and received standard of care for their respected conditions. Patients who needed critical care were admitted to coronary care unit isolation (CCU-I) which established in June 14, 2020.

Patient with confirmed COVID results remained in the isolation unit to continue their cardiac management,

![Chart](chart.png)

**Figure 1:** Results for coronavirus disease-2019 polymerase chain reaction tests in both isolation units and diagnosis
then, transferred to a COVID designated hospital for observation and management of COVID-19 symptoms. Testing for COVID-19 was done with polymerase chain reaction (PCR) using nasopharyngeal swab according to HMC CDC recommendations. Initially and based on the risk of having COVID infection, low risk patients were admitted to a standard ward with the standard precautions and those with moderate to high risk were admitted to the isolation unit. In April 12, 2020, the decision was made that all the patients admitted to the Heart Hospital will undergo PCR testing; one test for COVID-19 suspected low risk patients and two tests 24 h apart for high risk before sending to a standard ward.

Initially, the PCR results were reported as positive or negative but starting from June 23, 2020, any case with cycle threshold value above 33 was considered as reactive and noninfectious. All patients who had been transferred from other hospitals had undergone one swab in their admission facility.

The second swab was done in the isolation unit according to the defined HMC criteria: symptoms and/or signs consistent with COVID-19, with no confirmed etiology that explained the clinical presentation, or an abnormal baseline chest X-ray or chest computed tomography scan, or known close contact with suspected or confirmed case of COVID-19 within the last 14 days or less.

RESULTS

During the period from March 29, 2020 to July 31, 2020, a total of 607 patients were admitted to the isolation units (461 admitted to HDU-I and 146 admitted to CCU-I). Males represented 89% of the total admitted patients. Forty four percent were diagnosed with STEMI, 22% were non-STEMI (NSTEMI) or unstable angina (UA), 17% were decompensated heart failure (DHF), 7% were elective cases for coronary angiography or electrophysiology procedures, 8% for other diagnosis and 1% for both cardiac arrest and post cardiac

| Table 1: Patient demographics | HDU-I (March 29 to July 31), n (%) | CCU-I (June 14 to July 31), n (%) | Both isolation units (March 29 to July 31), n (%) |
|-------------------------------|----------------------------------|----------------------------------|-----------------------------------------------|
| Admitted COVID-19 suspected patients | 461                             | 140                             | 601                                           |
| Gender                        |                                  |                                  |                                               |
| Male                          | 410 (89)                         | 126 (90)                        | 536 (89)                                      |
| Female                        | 51 (11)                          | 14 (10)                         | 65 (11)                                       |
| Diagnosis                     |                                  |                                  |                                               |
| STEMI                         | 174 (38)                         | 91 (65)                         | 265 (44)                                      |
| NSTEMI/UA                     | 131 (28)                         | -                               | 131 (22)                                      |
| DHF                           | 90 (20)                          | 10 (7)                          | 100 (17)                                      |
| Elective procedures           | 42 (9)                           | -                               | 42 (7)                                        |
| Cardiac arrest                | -                                | 9 (6)                           | 9 (1)                                         |
| Post cardiothoracic surgery   | -                                | 7 (5)                           | 7 (1)                                         |
| Other                         | 24 (5)                           | 23 (16)                         | 47 (8)                                        |

COVID-19: Coronavirus disease-2019, DHF: Decompensated heart failure, NSTEMI: Non-ST Elevation Myocardial Infarction, UA: Unstable angina, HDU-I: High-dependency isolation unit, CCU-I: Coronary care isolation unit
surgery. Demographic details for HDU-I and CCU-I are presented in Table 1.

Most patients admitted to both isolation units tested negative for COVID-19 PCR (85.2%), 48 patients were positive (9%) and 34 were reactive (5.8%) [Figure 1]. Among the positive and reactive cases 88.6% needed one swab to make the diagnosis, while 11.4% needed second swab due to high suspicion of COVID-19.

Forty-nine percent (40 patients) of the positive or reactive were admitted as STEMI cases, 27% (22 patients) were NSTEMI/UA cases, 6% (five patients) were DHF cases, and 15% (18 patients) were for other diagnosis [Figure 1].

About 80.0% of the patients with positive or reactive PCR results that were admitted to HDU-I and CCU-I % had epidemiological risk, 8.4% had suggestive symptoms and 11.6% had abnormal chest X-ray. On the other hand, 45.7% of the patients with negative PCR results had epidemiological risk, 25.9% had suggestive respiratory infection symptoms, and 28.4% had abnormal chest X-ray [Figure 2].

There was no patient to patient or patient to caregiver infection during the study.

DISCUSSION

This study shows the importance of the isolation units in the only tertiary cardiac institute in Qatar in the era of COVID-19 to minimize transmission of the novel corona virus among patients and staff. The workflow strategy has been adopted to keep the patient admission process safe and efficient particularly in a country like Qatar with increasing number of COVID cases. Regarding STEMI patient, primary percutaneous coronary intervention was performed immediately to avoid the risk of delaying the procedure.

All PPCI procedures were done in an allocated catheterization laboratory which was assigned for COVID positive patients or patients with unknown COVID status. The procedure was performed with full PPE for the staff and all patients wore surgical masks during the procedure. Then, patients transferred to HDU-I or CCU-I to be tested and managed.

Other cardiac patients were admitted to isolation units for assessment by the isolation unit team then transferred accordingly either to the standard ward or COVID facility. Patients transferred to COVID facility were monitored by onsite cardiology team.

Staff in the catheterization laboratory or operating room were traced and assessed by infection control team for any possibility of contracting COVID-19.

According to our observation in this study, epidemiological risk factors including recent travel, close contact with suspected or confirmed cases within 14 days or less, living in shared accommodation or living in lockdown area were the main risk factors (hazard ratio 1.77). It is even more important than having suggestive symptoms and/or abnormal findings in the chest X-ray. Our finding stressed the importance of social distancing to avoid infection with COVID-19.

CONCLUSION

The study demonstrated that the transmission of COVID-19 in a hospital setting can be controlled through an isolation unit in collaboration with other teams and institutions. Our isolation units have contributed effectively in protecting staff and prevent staff to patient and patient to patient COVID-19 transmission. This helped in keeping the Heart Hospital as a safe environment for patients and staff.

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Conflicts of interest There are no conflicts of interest.

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