ECG: essential in care of patients with COVID-19

To the Editor: Cardiac injury has been reported in about 20% of patients with coronavirus disease 2019 (COVID-19) admitted to hospital.[1] Elevated troponin is associated with higher complications and death rates.[2,3] We report our experience in managing the cardiovascular care of all patients with COVID-19 admitted to our 783-bed quarternary hospital in Perth between 1 February and 1 May 2020. The hospital approved the data collection for a clinical quality improvement audit and provided an exemption from ethics review and approval to publish the results. Patients with COVID-19 with an abnormal electrocardiogram (ECG) showed markers of increased disease severity, had a longer hospital stay and intensive care unit (ICU) admission.

Eighteen patients (11 males), with a mean age 59 years (standard deviation [SD], 18), were admitted for a mean 14 days (SD, 15) with symptoms of cough (78%), fever (72%), dyspnoea (61%), fatigue (44%), chest pain (22%), and presyncope (5%). The mean presentation was 6 days (SD, 4) from onset of symptoms. Eight patients required admission to the ICU, and we recorded no deaths. The comorbidities included obesity (four patients), ischaemic heart disease (two patients), diabetes mellitus (four patients), and hypertension (six patients).

Cardiac investigations included ECGs (72%), high sensitivity troponin (67%), brain natriuretic peptide (7%), and echocardiogram (6%). Upon admission, eight patients (63%) had an abnormal ECG, which included PR depression, biphasic T waves, PR prolongation, Q waves, ST elevation, atrial flutter, right bundle branch block, and atrial trigeminy. Two patients had elevated troponin. All brain natriuretic peptide and echocardiogram results were normal. Patients who did not have an ECG had low risk markers for disease severity. Patients with a normal ECG had a mean heart rate 84 beats/min (SD, 11), mean QRS duration 92 milliseconds (SD, 9), and mean QTc interval 414 milliseconds (SD, 59) compared with patients with abnormal ECGs, who had a mean heart rate 93 beats/min (SD, 11), mean QRS 96 milliseconds (SD, 18), and mean QTc 400 milliseconds (SD, 110). Seven patients had repeat ECG during their admission. Five patients developed new abnormalities on follow-up ECGs, including transient ST elevation, sinus bradycardia, junctional rhythm, atrial fibrillation, and complete heart block.

Characteristics of patients with coronavirus disease 2019 (COVID-19) admitted to hospital

	Total	Abnormal ECG	Normal ECG	No ECG
Total number of patients	18	8	5	5
Age (years), mean (SD)	59 ± 19	67 ± 14	52 ± 15	53 ± 24
Admission (days), mean (SD)	14 ± 15	21 ± 19	13 ± 11	3 ± 2
Ferritin (μg/L), mean (SD)	1594 ± 1658	2328 ± 2141	1089 ± 620	970 ± 1206
Creatinine (μmol/L), mean (SD)	103 ± 64	110 ± 71	86 ± 33	110 ± 82
CRP (mg/L), mean (SD)	166 ± 165	255 ± 198	124 ± 108	39 ± 42
D-dimer (mg/L), mean (SD)	4.17 ± 6.23	7.03 ± 8.29	1.99 ± 1.39	0.64 ± 0.42
Arrhythmias	9	7	< 5	na
Number of patients requiring oxygen	10	6	< 5	< 5
Oxygen use (days), mean (SD)	19 ± 14	23 ± 15	15 ± 11	4
ICU admission (days), mean (SD)	19 ± 11	23 ± 11	12 ± 9	Nil
Ventilation (days), mean (SD)	14 ± 10	18 ± 10	7 ± 5	Nil
Inotropic support (days) mean (SD)	13 ± 12	18 ± 12	5 ± 6	Nil

CRP = C-reactive protein; ECG = electrogardiogram; ICU = intensive care unit; na = not applicable; SD = standard deviation.

Our data show a consistent trend of increased disease severity in patients with abnormal admission ECG (Box). Patients with abnormal ECG required longer hospital admission (61% longer), double the incidence of documented arrhythmias, and double the requirement for oxygen, ventilation and inotropic support. Measures of significant inflammatory response (ferritin, C-reactive protein, D-dimer) were markedly higher in patients with abnormal ECG.

Half of the patients developed an abnormal rhythm during admission: complete heart block (one patient), supraventricular tachycardia (one patient), atrial fibrillation (three patients), sinus tachycardia (three patients), and sinus bradycardia (one patient). Cardiac procedures performed were transesophageal echocardiogram/cardioversion (one patient), and pacemaker implantation (one patient).

Our limited experience suggests an ECG may be helpful in prognostication and triaging of all patients with COVID-19. An abnormal rhythm may arise from cardiac stress due to cytokine response, direct myocardial viral injury, or physiological strain from multi-organ injury. Pulmonary injury from pneumonia, acute respiratory distress syndrome and pulmonary emboli can lead to significant right ventricular strain that predisposes to arrhythmia. Sepsis, and related cytokine response, is associated with atrial fibrillation. Myocardial inflammation and subsequent scarring can lead to ventricular arrhythmia and conduction disorders.

ECG is a low cost test that can be performed easily and rapidly with minimal risk of viral exposure to staff. ECG should be an essential test in the COVID-19 pandemic.

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Competing interests: No relevant disclosures.

doi: 10.5694/mja2.50841

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