Cardiac arrest in patients hospitalized for COVID-19: a tertiary medical center retrospective cohort study

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Background/Introduction: Patients with COVID-19 are at increased risk for mortality during hospitalization. Better definition of the incidence, predictors, and outcomes of cardiac arrest during hospitalization for COVID-19 may support early identification and intervention.

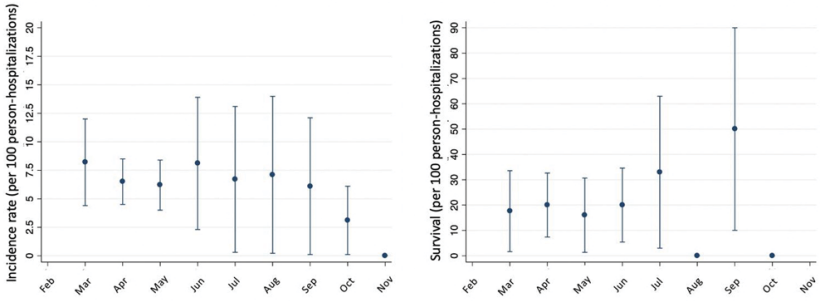
Purpose: To estimate the incidence of in-hospital cardiac arrest in patients with COVID-19, describe the temporal trends in incidence of and survival after cardiac arrest, summarise characteristics of those who experienced a cardiac arrest, and compare the characteristics of survivors versus non-survivors of cardiac arrest.

Methods: We conducted a retrospective cohort study of patients admitted for COVID-19 to a tertiary medical center comprising three hospitals between March and November 2020. Data entry is ongoing for more than 2000 patients admitted through 2021. Clinical variables extracted via review of electronic medical records included age, sex, race/ethnicity, body mass index, history of cardiovascular disease (ie., coronary artery disease, congestive heart failure, atrial fibrillation, or cerebrovascular event), other comorbidities included in the Charlson comorbidity index, date of admission, duration of hospitalization, all cardiac arrest events during hospitalization, presenting rhythm during first cardiac arrest, and death. Data were described using summary statistics. Multivariable logistic regression was used to evaluate associations.

Results: Among 1666 patients, 107 (6.4%) experienced at least one in-hospital cardiac arrest event during hospitalization for COVID-19, of which 25 (23%) survived to hospital discharge. From March to October 2020, there was a decrease in estimated cardiac arrest incidence in-hospital from 8.2% to 3%, whereas estimated survival to hospital discharge after an arrest remained similar at approximately 20% (Figure). Compared to those who did not, patients who experienced in-hospital cardiac arrest were older and more likely to have existing cardiovascular disease, as well as other comorbidities. Similar factors were associated with lower chance of survival after cardiac arrest (Table). Patients with pulseless ventricular tachycardia/fibrillation (VT/VF) as presenting rhythm in cardiac arrest had better survival to hospital discharge compared to those with other rhythms (OR 3.3, p=0.02). Younger age (per 10 years, OR=0.7, p=0.03) and fewer comorbidities (per one fewer comorbidity, OR=1.5, p=0.05) were associated with better survival after cardiac arrest in multivariable logistic regression.

Conclusion: There was a decline in estimated incidence of cardiac arrest during hospitalization for COVID-19 since beginning of pandemic, with survival to hospital discharge after cardiac arrest estimated to be stable at around 20%. Younger age and fewer comorbidities especially cardiovascular disease were associated with better survival after an in-hospital cardiac arrest.

Figure. Incidence of in-hospital cardiac arrest (a) and survival to hospital discharge after cardiac arrest (b) by month of hospital admission.



a. Estimated incidence of in-hospital cardiac arrest (per 100 person-hospitalizations) by month of hospitalization in 2020

b. Estimated survival to hospital discharge after cardiac arrest (per 100 person-hospitalizations) by month of hospitalization in 2020

Figure 1

Table. Characteristics of patients who survived to hospital discharge after an in-hospital cardiac arrest compared to those who did not.

Characteristics	Patients who experienced at least one in-hospital cardiac arrest (N=107)	Patients who survived to hospital discharge after a cardiac arrest (N=25)	Patients who did not survive to hospital discharge after cardiac arrest (N=82)	P-value
Mean age (SD), years	62 (15)	54 (18)	64 (14)	0.049
Female (proportion), N	40 (37%)	7 (28%)	33 (40%)	0.27
Black race (proportion), N	37 (35%)	10 (40%)	27 (33%)	0.52
Hispanic (proportion), N	11 (10%)	0 (0)	11 (13%)	NA*
Body mass index (SD), kg/m^2	32 (8)	33 (9)	32 (8)	0.64
History of cardiovascular disease (proportion), N	90 (84%)	24 (96%)	66 (81%)	0.04
Number of comorbidities† (25^{th} -75^{th} percentile), N	2 (1-3)	2 (2-3)	2 (1-3)	0.38
Duration of hospitalization (25^{th} -75^{th} percentile), days	10 (5-21)	8 (2-16)	11 (6-22)	0.35
Pulseless VT/VF as first rhythm (proportion), N	20 (19%)	8 (33%)	12 (14%)	0.02

SD, standard deviation. VT, ventricular tachycardia. VF, ventricular fibrillation.

* Statistical testing not available due to collinearity.

† Comorbidities included in the Charlson comorbidity index include myocardial infarction, congestive heart failure, peripheral vascular disease, cerebrovascular accident or transient ischemic attacks, dementia, chronic obstructive pulmonary disease, connective tissues disease, peptic ulcer disease, liver disease, diabetes mellitus, hemiplegia, chronic kidney disease, solid tumor, leukemia, lymphoma, acquired immunodeficiency syndrome.

Table 1