High sensitivity troponin I and newly/recently diagnosed coronavirus-19 disease patients presenting to the emergency department: values above and below the 99th percentile predict 28 day mortality

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Background: Studies indicate that the presence of cardiac injury [troponin level > the 99th percentile upper reference limit (99th % URL) using mostly contemporary assays] is predictive of death within 30 days during hospitalization of coronavirus disease 2019 (COVID-19) patients. Troponin measurements in these reports were ordered and/or resulted in the Emergency Department (ED) or during various times after hospital admission and not all patients were followed for 30 days.

Purpose: Our objective was to determine the 28 day survival prognostic value of Emergency Department (ED) resulted high sensitivity cardiac troponin I (hs-cTnI) measurements in all COVID-19 patients including those discharged after their ED visit or hospitalization.

Methods: An ED centric electronic database of COVID-19 patients (nasopharyngeal swab testing within 1 week prior to or during the ED visit) having at least 1 hs-cTnI (Beckman Coulter, Brea, CA; level of quantitation (LoQ) 4ng/L, non sex specific 99th % URL 18 ng/L) value reported during a visit to an urban, academic ED in the United States was constructed. All patients were followed for 28 days and Kaplan Meir survival curves constructed amongst predetermined initial hs-cTnI value intervals.

Results: From March 16-November 2, 2020 1476 consecutive ED COVID-19 patients were identified with 1044 (70.7%) having at least 1 hs-cTnI value resulted in the ED. Patients' mean age and body mass index were 60.8±16.1 years and 32.4±11.3 kg/m² respectively. 531 (50.9%) were male, 804 (77.0%) self-identified as African American and 615 (58.9%) had 2 or more comorbidities with hypertension (42.5%), diabetes (37.4%) and hyperlipidemia (27.23%) commonest. Frequent primary presenting complaints were shortness of breath (37.7%), fever/chills (14.5%) and cough (11.9%). Hs-cTnI interval values were: 147 (14.1%) <4 (LoQ), 359 (34.4%) 4–10 and 151 (14.5%) 11–18 ng/L. Hs-cTnI values were >99th % URL in 387 (37.1%) patients with 230 (22.0%) 19–54, 63 (6.0%) 54–99 and 94 (9.0%) ≥100 (laboratory reported critical value) ng/L. 145 (13.9%) patients were discharged directly home and 2 (0.2%) died in the ED. 147 (14.1%) were admitted to an ICU with 104 (70.7%) dying. Each of the interval initial ED hs-cTnI values was associated with a different (p<0.001) 28 day survival curve.

Conclusions: Most COVID-19 patients had a hs-cTnI value obtained with 85.9% of these >4 ng/L. No one with an initial hs-cTnI <4 ng/L died within 28 days while increasing presenting hs-cTnI values >4 ng/L were associated with decreased 28 day survival. Our findings indicate that in COVID-19 patients detectable initial ED hs-cTnI values, whether reaching thresholds for cardiac injury or not, are highly prognostic of 28 day survival. Studies are needed to better define how hs-cTnI values could alter early management of COVID-19 disease to improve outcomes for these patients.

Figure 1

Figure 2