

Letters to the Editor

Admission High-Sensitivity Cardiac Troponin vs a Biochemical Score for Predicting Mortality in Patients With COVID-19



To the Editor:

Emerging evidence indicates a role for cardiac troponin testing, specifically high-sensitivity cardiac troponin (hs-cTn) in hospitalized patients with coronavirus disease 2019 (COVID-19).¹ Undetectable levels of hs-cTn in patients with (and without) COVID-19 may be helpful in identifying a low-risk subgroup, with higher levels useful in identifying patients at high-risk for hospital death.^{1,2} Further improvements in risk-stratification for emergency department or hospitalized patients may be achieved by adding clinical chemistry tests, such as glucose and creatinine (ie, estimated glomerular filtration rate), to generate a clinical chemistry score (CCS).^{2,3} For patients with COVID-19, additional biochemical tests may have important prognostic roles—for example, urea level, which is already a component of the CURB-65 score (confusion, urea, respiratory rate, blood pressure, age \geq 65 years) used to risk stratify patients presenting to the hospital with pneumonia.⁴ We performed a retrospective chart review of COVID-19 patients admitted to hospitals in the city of Hamilton in order to explore the performance characteristics of hs-cTn levels, the CCS, and the CCS with urea (CCUS) to predict in-hospital death. This review included the first 26 weeks of the COVID-19 pandemic (ethics approval: #11425-C).

From March 16, 2020 to September 10, 2020, we identified 147 patients who were hospitalized at the Hamilton General Hospital, Juravinski Hospital, or St. Joseph's Healthcare, Hamilton with reverse transcriptase–polymerase chain reaction positive for severe acute respiratory syndrome coronavirus-2 (performed at the Hamilton regional laboratory medicine program; HRLMP). Of these 147 patients (3 still hospitalized), 48 (median age = 80 years) did not have hs-cTnI tests (Abbott [Chicago, IL] or Ortho Diagnostics [Raritan, NJ]), with an additional 40 without admission hs-cTnI measurement, leaving only 39 patients (median age = 72 years; 64% male; $n = 13$ deaths) with measures of admission hs-cTnI level, glucose level, estimated glomerular filtration rate, and urea level ($P = 0.05$ for age between groups). We calculated the CCS as has previously been described, with points ranging from 0 to 5.² The CCUS includes the CCS with an additional point of 1 assigned if the urea level was > 7 mmol/L (0 if below), thus yielding a range of 0–6 points.^{2–4} As 2 different

hs-cTnI assays (Abbott = 29 patients; Ortho = 10 patients) were used, we divided the results by the respective upper reference limits to normalize for analyses. Receiver operating characteristic curve analyses with the areas under the curve, and sensitivity and specificity estimates for in-hospital death, were performed.

The CCUS had the highest area under the curve for in-hospital death (0.81; 95% confidence interval [CI]: 0.65–0.92), higher than for hs-cTnI alone (0.69; 95% CI: 0.52–0.83; $P = 0.01$; Fig. 1). A CCUS ≤ 2 yielded a sensitivity = 92% (95% CI: 64–99) and a CCUS > 5 yielded a specificity = 92% (95% CI: 74–99). Major limitations include a small sample size and issues related to patient selection. This proof-of-principle study suggests that the prognostic performance of the hs-cTn level in patients with COVID-19 might be improved by the addition of routine biochemical tests.

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Ethics Statement

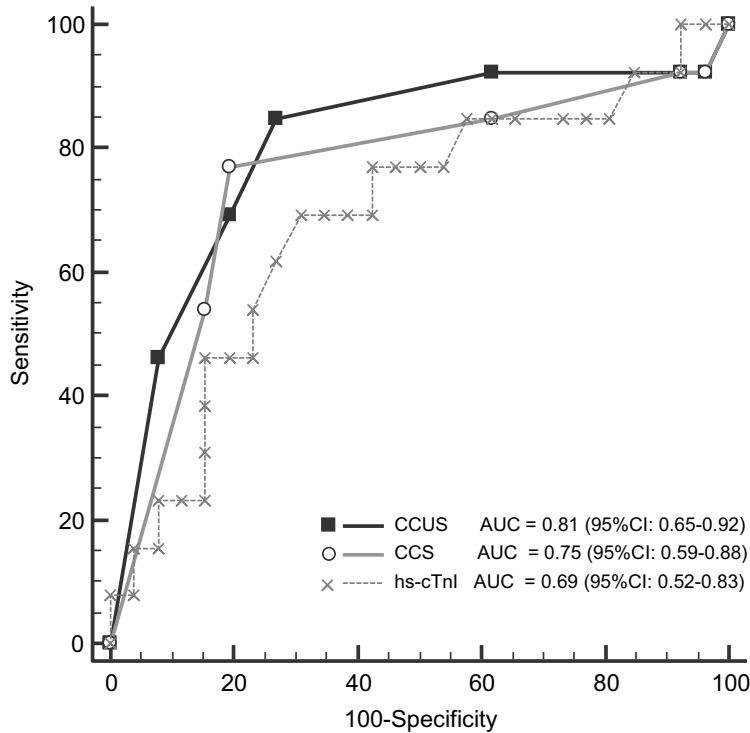
The Hamilton integrated research ethics board approved this study: #11425-C.

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Disclosures

P.A.K. has received grants/reagents/consultant/advisor honoraria from Abbott Laboratories, Abbott Point of Care, Beckman Coulter, Ortho Clinical Diagnostics, Randox Laboratories, Roche Diagnostics, and Siemens Healthcare Diagnostics. McMaster University has filed patents with P.A.K.



CCUS	Sensitivity	Specificity
>1	92%	8%
>2	92%	38%
>3	85%	73%
>4	69%	81%
>5	46%	92%

Figure 1. Receiver operating characteristic curve analyses for the clinical chemistry with urea score (CCUS), clinical chemistry score (CCS), high-sensitivity cardiac troponin (hs-cTnI) alone (ratio of hs-cTnI concentration/upper reference limit) for in-hospital mortality for patients with coronavirus disease 2019 (method of DeLong ER, DeLong DM, Clarke-Pearson DL. Comparing the areas under two or more correlated receiver operating characteristic curves: a nonparametric approach. *Biometrics* 1988;44:837-45.); difference between 2 areas under the curve (AUCs) yielded a *P* value = 0.01 between CCUS and hs-cTnI alone). CI, confidence interval.

and A.W. listed as inventors on a related area—“A Laboratory Score for Risk Stratification for Patients with Possible Cardiac Injury.”

References

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