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Commentary

# A novel scoring system in mortality prediction of severe patients with COVID-19

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*To the Editor:*—Coronavirus disease 2019 (COVID-19), which is caused by the infection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in December 2019, in Wuhan city, Hubei province, China, and spread rapidly and uncontrollably across the world, being declared a global pandemic [1]. At present, the COVID-19 epidemic in China is more under control, but the international situation is still grim. As of 01:33:17 AM on Jun 17, 2020, the total numbers of confirmed cases and the death toll worldwide had reached 8,084,396 and 438,399, respectively, and the global data curve of confirmed cases outside China exhibited a sharp upward trend [2]. It was reported that most of the dead were those with severe disease [3], casting a spotlight on the identification and management of high-risk cases with poor outcomes. Although several pre-existing scoring systems derived from the emergency department possess certain prediction value for critically ill patients with COVID-19, their effectiveness are still far from perfection and satisfaction [4].

The study by Shang et al. [3], for the first time, attempted to generate a specific scoring system to predict in-hospital deaths for severe COVID-19 patients. They found old age, coronary heart disease, percentage of lymphocytes, procalcitonin and D-dimer were independently related to mortality. Based on the hazard ratio, they defined the score distributions for the 5 variables: age between 60 and 75 points was 1 point while 75 plus was 2 points, coronary heart disease condition was 1point, percentage of lymphocytes<8% was 1 point, D-dimer>0.5 ug/ml was 1 point and procalcitonin>0.15 ng/ml was 2 points, upon which they established the COVID-19 scoring system (CSS) and divided severe patients into low-risk (0 to 2 points) and high-risk (more than 2 points) groups.

According to their study, CSS displayed good discrimination (AUC=0.919) and calibration ($P = 0.264$), holding considerable value for predicting hospital mortality and complications. Furthermore, it had the potential to provide guidance for the rational use of corticosteroids and the selection of applicable populations, as the application of corticosteroids was assessed to prolong the duration of hospital stays in the low-risk group. Additionally, the authors demonstrated that the time from acute kidney injury to death was shorter than that of acute liver injury and acute myocardial injury. Accordingly, more attention should be paid to the early monitoring of renal function.

However, there are still some concerns regarding the clinical value of CSS. Firstly, further stratified analysis by separating the patients into certain subgroups may yield more in-depth findings, as different collections of patients can present with distinct unfavorable factors of fatal outcomes. For instance, patients with cancer have been demonstrated to be more vulnerable to severe COVID-19, and risk factors for death of these patients include undergoing chemotherapy within 4 weeks before COVID-19 symptom onset, male sex, advanced tumor stage, elevated tumor necrosis factor $\alpha$, and among others [1,5]. Secondly, patients enrolled in their study were entirely from Wuhan, Hubei province, while altered epidemiological, clinical and virological characteristics during the spread of COVID-19 have been reported outside Wuhan city. For example, a higher incidence of gastrointestinal symptoms in patients, accompanied by increased severe/critical tendency, has been shown in Zhejiang province [6]. Thirdly, the authors explained the heart being damaged earlier than kidney and liver might be due to the highly expressed cardiac angiotensin-converting enzyme 2 (ACE2), by which SARS-CoV-2 utilizes to enter human cells. Nevertheless, ACE2 binding cannot completely underlie the tissue tropism of SARS-CoV-2. For instance, ACE2 is also highly expressed in testis [7] whereas corresponding clinical manifestations in COVID-19 patients have rarely been reported [6,8–10]. Finally, the number of severe illnesses was small and some of the unfavorable prognostic factors introduced by other research were not presented in their study due to the absence of electronic medical data. Collectively, larger and multicenter cohort studies with more detailed analysis strategies are warranted to validate CSS in the future.

## Declaration of Competing Interest

All authors declare no conflict of interest.

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