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Clinical features, risk factors and a prediction model for in-hospital mortality among diabetic patients infected with COVID-19: data from a referral centre in Iran

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**Abstract**

Objectives: The aim of this study was to identify risk factors of in-hospital mortality among diabetic patients infected with COVID-19.

Study design: This is a retrospective cohort study.

Methods: Using logistic regression analysis, the independent association of potential prognostic factors and COVID-19 in-hospital mortality was investigated in three models. Model 1 included demographic data and patient history; model 2 consisted of model 1, plus vital signs and pulse oximetry measurements at hospital admission; and model 3 included model 2, plus laboratory test results at hospital admission. The odds ratios (ORs) and 95% confidence intervals (95% CIs) were reported for each predictor in the different models. Moreover, to examine the discriminatory powers of the models, a corrected area under the receiver-operating characteristic curve (AUC) was calculated.

Results: Among 560 patients with diabetes (men = 291) who were hospitalised for COVID-19, the mean age of the study population was 61.8 (standard deviation [SD] 13.4) years. During a median length of hospitalisation of 6 days, 165 deaths (men = 93) were recorded. In model 1, age and a history of cognitive impairment were associated with higher mortality; however, taking statins, oral antidiabetic drugs and beta-blockers was associated with a lower risk of mortality (AUC = 0.76). In model 2, adding the data for respiratory rate (OR 1.07 [95% CI 1.00–1.14]) and oxygen saturation (OR 0.95 [95% CI 0.92–0.98]) slightly increased the AUC to 0.80. In model 3, the data for platelet count (OR 0.99 [95% CI 0.99–1.00]), lactate dehydrogenase (OR 1.002 [95% CI 1.001–1.003]), potassium (OR 2.02 [95% CI 1.33–3.08]) and fasting plasma glucose (OR 1.04 [95% CI 1.02–1.07]) significantly improved the discriminatory power of the model to AUC 0.86 (95% CI 0.83–0.90).

Conclusions: Among patients with type 2 diabetes, a combination of past medical and drug history and pulse oximetry data, with four non-expensive laboratory measures, was significantly associated with in-hospital COVID-19 mortality.

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**Introduction**

Diabetes is one of the most frequent comorbidities in patients who are hospitalised for coronavirus disease 2019 (COVID-19). Previous systematic reviews have demonstrated that diabetes is a risk factor for severe disease and is associated with an approximately 2–3 fold increased mortality rate from COVID-19 compared