# Modified CHA2DS2-VASc can predict mortality in COVID-19 patients admitted to the emergency department

B.V. Silva[1], C. Jorge[1], C. Mendonca[2], M.L. Urbano[2], T. Rodrigues[1], P. Silverio Antonio[1], J. Brito[1], P. Alves Da Silva[1], B. Garcia[1], C. Martins[1], J. Rigueira[1], I. Ricardo Aguiar[1], M. Nobre Menezes[1], R. Placido[1], F. J Pinto[1]

[1]*Centro Hospitalar Universitário Lisboa Norte, Centro Cardiovascular da Universidade de Lisboa, Serviço de Cardiologia, Departamento de Coração e Vasos, Lisbon, Portugal;* [2]*Hospital de Santa Maria Faculty of Medicine, Radiology Department, Lisbon, Portugal*

**Introduction:** CHA2DS2-VASc score is used to determine the thromboembolic risk, but its prognostic value has been demonstrated in several cardiovascular (CV) diseases. Except for female gender, many CV risk factors comprising this score are recognized as risk factors for mortality in COVID-19. Cetinak G. et al demonstrated the ability of modified CHA2DS2-VASc (M-CHA2DS2-VASc) to predict mortality in COVID-19, which is based on changing gender criteria from female to male.

**Purpose:** To evaluate the prognostic value of a M-CHA2DS2-VASc score to predict pulmonary embolism (PE) and mortality in pts with COVID-19 admitted at the emergency department (ED).

**Methods:** Retrospective study of pts admitted to the ED between June 2020-January 2021, who underwent computed tomography pulmonary angiography (CTPA) due to PE suspicion. Pts were stratified into 3 M-CHA2DS2-VASc risk groups: lower (0–1), intermediate (2–3) and high risk ($\geq$4). Kruskal-Wallis and X-square test were used to compare score risk groups. Logistic regression was used to determine predictors of PE and mortality. ROC curve was performed to evaluate the discriminative power of the score.

**Results:** We included 300 pts: median age 71 years, 59% male. Hypertension (59%) chronic kidney disease (CKD, 33%), dyslipidemia (32%) and diabetes (28%) were the most common comorbidities. PE was diagnosed in 46 pts (15%). We found no difference in PE incidence according to M-CHA2DS2-VASc groups (p=0.531) and it showed no predictive value for PE (OR: 1.050, p=0.596). The AUC of M-CHA2DS2-VASc was 0.52, suggesting no discriminative power to predict PE.

Regarding mortality, M-CHA2DS2-VASc score was higher in non-survivors COVID-19 pts than in survivors [4 (IQR 3–5) vs 2 (1–4), respectively, p<0.001]. A multivariate logistic regression analysis was performed for mortality based on M-CHA2DS2-VASC, troponin, CKD and smoking history, and only M-CHA2DS2-VASc was identified as an independent predictor of mortality (OR: 1.406, p=0.007). Kaplan-Meier showed that M-CHA2DS2-VASc score was associated with mortality: the survival rate was 92%, 80% and 63% in the lower, intermediate and higher M-CHA2DS2VASc score risk group (logrank test p<0.001; Fig. A).

Most of the pts in the cohort were hospitalized (83%), but 21 pts (17%) discharged from the ED. Among these pts, 33% (n=17) had low risk, 37% (n=19) intermediate risk and 29% (n=15) high risk for mortality according to the M-CHA2DS2VASc score. The Kaplan-Meier individual survival analysis for hospitalized patients (Fig. B) and for those discharged from the ED (Fig. C) showed that M-CHA2DS2-VASc score had a good discriminative ability to predict short-term mortality for both groups (logrank test p<0.001 and p=0.007, respectively).

**Conclusion:** Considering the lack of validated scores to predict mortality in COVID-19 pts, the M-CHA2DS2-VASc might be a simple tool to predict short-term mortality in these pts, irrespectively of the need for hospitalization or not.