

Prediction of Fatal Major Adverse Cardiovascular Events After First Acute ST-Segment Elevation Myocardial Infarction Using Clinical, Lifestyle, and Psychosocial Data

Hamid Reza Marateb¹, Marjan Mansourian², Kouhyar Tavakolian³, Hamidreza Roohafza⁴, Masoumeh Sadeghi⁴

¹Institute for Research and Innovation in Health (IRIS), Universitat Politècnica de Catalunya-BarcelonaTech (UPC), Spain; ²Epidemiology and Biostatistics Department, School of Health, Isfahan University of Medical Sciences (IUMS), Iran; ³University of North Dakota, Grand Forks, United States; ⁴Cardiovascular Research Institute, IUMS, Iran.

Fatal major adverse cardiovascular events after a first acute ST-segment elevation myocardial infarction remain difficult to predict when psychosocial and lifestyle information is omitted from conventional clinical models. Following the published CRAS-MI cohort methodology (Roohafza et al., Curr Probl Cardiol, 2023;48:101158) and ethics approval IR.NIMAD.REC.1397.295, we analyzed 1,730 modeling records from a multicenter cohort of patients enrolled at their first acute STEMI, with annual follow-up over 3 years. The modeled fatal endpoint reflected the fatal component of MACE, namely cardiovascular death from coronary artery disease or cerebrovascular disease. The dataset included 79 fatal outcomes (4.6%); mean age was 56.2±9.9 years, mean body mass index was 26.6±4.1 kg/m², and 82.3% of participants were male. A TabNet classifier was enhanced with derived interaction terms, tuned class weighting, repeated stratified 5-fold cross-validation, and probability calibration; isotonic regression gave the best Brier score. Feature-importance scores highlighted anxiety, type D personality, quality of life, sleep efficiency, physical activity, stress-related variables, depression categories, and LDL among the most influential predictors. Model performance is summarized in Table 1 and Fig. 1. These findings suggest that

psychosocial and lifestyle factors add clinically relevant signal for prediction of fatal cardiovascular events after first acute STEMI.

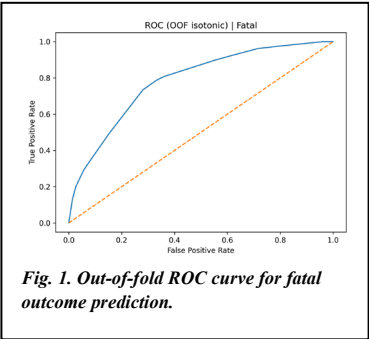


Table 1. Test set model summary.	
Performance Index	Value (95% CI)
AUROC	0.784 (0.728–0.829)
Brier Score	0.041 (0.033–0.048)