The TIMI risk score predicted mortality in patients with ST-elevation myocardial infarction

Morrow DA, Antman EM, Parsons L, et al. **Application of the TIMI risk score for ST-elevation MI in the National Registry of Myocardial Infarction 3.** JAMA. 2001 Sep 19;286:1356-9.

QUESTION

In patients with ST-elevation myocardial infarction (STEMI), how accurate is the Thrombolysis in Myocardial Infarction (TIMI) risk score for predicting in-hospital, all-cause mortality?

DESIGN

The TIMI risk score (developed and validated in several clinical trials) was further evaluated among patients with STEMI from the National Registry of Myocardial Infarction 3 (NRMI 3).

SETTING

Data for NRMI 3 were collected from 1529 hospitals in the United States.

PATIENTS

84 029 patients (mean age 69 y, 59% men) who had STEMI or presumed new left bundle-branch block, completed their stay at the admitting hospital, and were not in cardiogenic shock at the initial evaluation.

DESCRIPTION OF PREDICTION GUIDE

The TIMI risk score for STEMI is a weighted integer score based on 8 clinical risk indicators ascertained at presentation. The risk indicators are age ≥ 75 years (3 points) or 65 to 74 years (2 points); history of diabetes, hypertension, or angina (1 point); systolic blood pressure < 100 mm Hg (3 points); heart rate > 100 beats/min (2 points); Killip class II to IV (2 points); weight < 67 kg (1 point); anterior ST-elevation or left bundle-branch block (1 point); and time to reperfusion therapy > 4 hours (1 point). For each patient, the score is calculated as the arithmetic sum of the points for each risk feature present (range, 0 to 14).

MAIN OUTCOME MEASURE

All-cause mortality predicted by using the TIMI risk score.

MAIN RESULTS

In-hospital, all-cause mortality occurred in 12.6% of patients. 48% of patients received reperfusion therapy. An increase in the TIMI risk score from 0 to ≥ 8 points was equivalent to a 30-fold graded increase in risk for all-cause mortality ($P < 0.001$ for trend). The risk score showed strong prognostic accuracy in the entire NRMI-3 population (area under the receiver-operating characteristic curve [AUROC] = 0.74 vs 0.78 in the derivation set [among patients from the InTime II trial]) and among patients who received acute reperfusion therapy (AUROC = 0.79), who were treated with fibrinolytics (AUROC = 0.79), and who received percutaneous coronary interventions (AUROC = 0.80). Prognostic accuracy for the risk score was low among patients not receiving reperfusion therapy (AUROC = 0.65). The observed mortality rates for patients in NRMI 3 who received reperfusion therapy were strongly correlated with risk estimates from the derivation set of patients ($r = 0.99$).

CONCLUSION

In patients with ST-elevation myocardial infarction, the Thrombolysis in Myocardial Infarction risk score showed strong prognostic accuracy for predicting all-cause mortality among patients who had been treated with reperfusion therapy.

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Major clinical predictors of in-hospital death in patients who receive early reperfusion therapies

Risk factors	Adjusted odds ratio (95% CI)	Reference
Age ≥ 75 years	5.9 (2.9 to 12.2)	3*†
Killip class II to IV	1.8 (1.2 to 2.8) 4.8 (2.3 to 9.6)	2* 4†
Systolic blood pressure < 100 mm Hg	2.2 (2.0 to 2.4)	5*†
Heart rate > 100 beats/min	1.9 (1.1 to 3.4)	2*
Any arrhythmia	9.1 (4.3 to 19.2)	3*
Atrial fibrillation	2.0 (1.7 to 2.3)	6†
QRS duration > 0.11 sec	7.1 (3.0 to 17.1)	4†
In-hospital stroke	18.9 (3.3 to 107.2)	3*

*Patients received primary percutaneous revascularization.
†Patients received thrombolytic therapy.

COMMENTARY

The study by Morrow and colleagues on the TIMI risk score adds little to our current knowledge, much of which is based on the famous classification by Thomas Killip (1) (Table). Most clinicians will probably not formally calculate a risk score in the emergency room or critical care unit. Instead, most will admit patients with STEMI to a critical care setting and appropriately offer efficacious treatments to all. Then they will re-examine whether these therapies are working and pay heed to the items listed in the Table.

Joel Ray, MD, MSc
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