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Prediction of in-hospital mortality and cardiogenic shock in STEMI: a comparison between TIMI, GRACE and a New Score

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On behalf: Portuguese Registry on Acute Coronary Syndromes

Topic(s):
Acute Cardiac Care – Cardiogenic Shock

Citation:

Background: Traditionally, TIMI has been used for stratification of in-hospital mortality (IHM) in ST-elevation myocardial infarction (STEMI) and GRACE in non-STEMI patients. A new score validated in the Swedish population, which included clinical variables at admission was associated to higher IHM in patients with MI. However, none of the scores was evaluated as a predictor of cardiogenic shock (CS).

Purpose: To assess the ability of a New Score and GRACE to predict IHM and CS in a STEMI Portuguese population, as compared to TIMI. We aimed to create a cut-off point to help clinicians define a higher-risk group of patients for each score and for each outcome.

Methods: Consecutive patients (N=6757) who were admitted with suspected STEMI were identified through a national multicentric national registry. We excluded patients with cardiac arrest or CS prior to admission. We defined IHM as a primary outcome and CS as a secondary outcome. We calculated GRACE, TIMI and a New Score by using the following variables: age=50 years (1 point), male sex (1 point), ST-T abnormalities (2 points), Killip Class>1 (2 points), heart rate<40 or =100bpm (2 points), and systolic blood pressure <100mmHg (4 points). The area under the ROC curve (AUC) assessed its discrimination power. We identified the most appropriate cut-off values based on the point where the Youden’s Index was maximum, thus creating high risk groups for each clinical event. Logistic regression models evaluated independent association of high risk scoring with the studied events.

Results: We included 5294 patients with STEMI, in which GRACE score was better than TIMI and the New Score at predicting both IHM (AUC: GRACE 0.866 (IC95% 0.856-0.805) versus TIMI 0.837 (IC95% 0.827-0.847), p=0.009; GRACE vs New Score 0.692 (IC95% 0.679-0.704), p<0.001) and CS (AUC: GRACE 0.794 (IC95% 0.783-0.805) vs TIMI 0.771 (IC95% 0.759-0.782), p=0.029; GRACE vs New Score 0.687 (IC95% 0.674-0.699), p<0,001) (see Table 1). Additionally, comparing to TIMI, the New Score was worse at predicting IHM and CS (p<0.001). According to the most appropriate cut-off points identified, logistic regression models showed that patients with GRACE=184 (OR 4.46; IC95% 2.60-7.64) and TIMI=6 (OR 2.55 IC95% 1.55-4.18) had, respectively, 4.5 and 2.6 times higher risk for IHM than patients with lower scores. On the other side, GRACE=173 (OR 1.82; IC95% 1.04-3.20) increased 1.8 times the risk to develop CS. It was not possible to define a cut-off point for the New Score.

Conclusions: In STEMI patients, all scores studied performed well at predicting IHM and CS. Even if GRACE score is not well validated for STEMI, it performed better than TIMI at predicting IHM and CS, and TIMI did better than the New Score. Patients with high-risk scores according to the defined cut-offs may need closer monitoring and more aggressive therapy.
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<table>
<thead>
<tr>
<th>Score</th>
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<th>IH Cardiogenic Shock</th>
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<tbody>
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<td>New Score</td>
<td>0.692; IC95% 0.679-0.704</td>
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New Score vs TIMI/GRACE: p<0.001
TIMI vs GRACE: p=0.009