Dante Pazzanese Risk Score for Non-ST-Segment Elevation Acute Coronary Syndrome

Elizabete Silva dos Santos1,2, Ari Timerman2, Valéria Troncoso Baltar2, Maria Tereza Cabrera Castillo2, Marcos Paulo Pereira2, Luiz Minuzzo2, Leopoldo Soares Piess2

Instituto do Coração (InCor) HC-FMUSP; Instituto Dante Pazzanese de Cardiologia; São Paulo, SP, Brasil

Summary

Background: The probability of adverse events estimate is crucial in acute coronary syndrome condition.

Objectives: To develop a risk score for the brazilian population presenting non-ST-segment elevation acute coronary syndrome.

Methods: One thousand and twenty seven (1,027) patients were investigated prospectively at a cardiology center in Brazil. A multiple logistic regression model was developed to estimate death or (re)infarction risk within 30 days. Model predictive accuracy was determined by C statistic.

Results: Combined event occurred in 54 patients (5.3%). The score was created by the arithmetic sum of independent predictors points. Points were determined by corresponding probabilities of event occurrence. The following variables have been identified: age increase (0 to 9 points); diabetes mellitus history (2 points) or prior stroke (4 points); no previous use of angiotensin converting enzyme inhibitor (1 point); creatinine level increase (0 to 10 points); the combination of troponin I level increase and ST-segment depression (0 to 4 points). Four risk groups were defined: very low (up to 5 points); low (6 to 10 points); intermediate (11 to 15 points); high risk (16 to 30 points). The C statistic was 0.78 for event probability, and 0.74 for risk score.

Conclusion: A risk score of easy application in the emergency service was developed to predict death or (re)infarction within 30 days in a brazilian population with non-ST-segment elevation acute coronary syndrome.(Arq Bras Cardiol 2009; 93(3) : 319-326)

Key Words: Cardiovascular diseases; unstable angina; myocardial infarction; prognostic; risk factors.

Introduction

Cardiovascular diseases are the first cause of death not only in developed countries but in developing countries as well1.

The risk of death or of recurrent ischemic events among patients with non-ST-segment elevation acute coronary syndrome varies widely due to heterogeneity. Therefore, it is important that the risk of experiencing these adverse events be determined for initial screening at the emergency department, as well as for identifying those patients who may benefit from potent but expensive and sometimes risky new therapies2. It is also crucial when choosing the most appropriate location for medical care and the recommendation of early invasive strategy3. The decision on the therapy to be used for each patient depends on their clinical presentation as well as the benefits from treatment choice4, which is to deliver benefits that make up for the risks from adverse results.

The strategy for risk stratification aims at assessing the variables that may predict adverse results at the point in time when patients are being screened at the emergency unit5 and must be based on the combination of patient’s clinical history, symptoms, electrocardiographic changes, plasma biomarkers, and risk score results6.

Study objective was to develop a risk stratification model that would be simple, and of easy application at the emergency unit for a brazilian population that had not gone through a selection, and using clinical, electrocardiographic variables as well as plasma biomarkers.

Methods

Study Population

This was a prospective study of non-ST-segment elevation acute coronary syndrome patients, recruited in the period between July 1, 2004 and October 31, 2006, and developed at the emergency unit. The institution is a tertiary cardiology center, with an emergency unit open to medical assistance and hospital admittance for a wide variety of clinical conditions7. Study Protocol was approved.
by the local Research Ethics Committee. All patients signed the Informed Consent Form.

The inclusion criterion was having been diagnosed with non-ST-segment elevation acute coronary syndrome, with symptoms having been presented in the previous 48 hours: precordial or restroternal pain described as chest discomfort, tightness or burning for a period longer than 10 minutes or dyspnea or syncope that might be ischemic in origin. Exclusion criteria included: ST-segment elevation acute myocardial infarction; non-cardiac causes symptoms; secondary unstable angina; confounding electrocardiographic changes (pacemaker pace, atrial fibrillation rhythm, bundled branch block).

**Electrocardiogram (ECG)**

The following electrocardiographic changes were recorded at admittance: ST-segment depression $\geq 0.5$ mm in at least one electrocardiographic lead measured at 80 milliseconds from J point followed by horizontal or descending ST-segment based on previous TP segment; inversion of T wave $\geq 1$ mm in two contiguous leads, quantified by nadir measurement; pathologic Q waves that are 0.04 seconds long or longer, and amplitude larger than 1/3 of subsequent R wave in two contiguous leads.

**Laboratory Exams**

Blood samples were collected within 24 hours after admission. The following variables have been identified: hemogram, biochemistry, cardiac troponin I (cTnI), creatinaphosphokinase MB fraction (CK-MB) and high sensitivity C-reactive protein (hs-CRP). A second sample was collected 12 hours after the first for cTnI, CK-MB and hs - CRP level. The higher level of cTnI and hs - CRP was taken from the two samples. The samples were collected in dry vials with no anticoagulant added. After immediate centrifugation serum was kept in the freezer at – 80° C. Biomarkers level measurement was done through IMMULITE DPCMedLab automated chemiluminescence. Categorical data analysis was used for cTnI ($\geq 0.5$ ng/ml), since no values under 0.5 ng/ml or higher than 100 ng/ml were detectable through the methodology being used.

**Clinical Outcome**

Study outcomes included death due to all causes or (re)infarction within 30 days. (Re)infarction was considered as the clinical outcome whenever ischemic symptoms with new ST-segment elevation not shown on ECG at admission occurred within the first 24 hours from admission. In that period of time, either CK-MB or cTnI level increase with no new ST-segment elevation was related to admission event. After 24 hours, infarction was diagnosed by the presence of new Q waves or new CK-MB increases above normal level with or without ECG changes. For patients who had been submitted to percutaneous coronary interventions (PCI) or to coronary artery bypass graft (CABG) surgery, elevations that were respectively three or five times higher than CK-MB normal values were necessary for the diagnosis of procedure-related infarction.

**Statistical Analysis**

Categorical variables are presented through simple and relative distribution frequencies; continuous variables, through means and standard errors. A descriptive analysis was performed, and complemented by simple logistic regression of variables previously selected as independent variables. Variables with descriptive level $< 10\%$, as well as gender, were selected for multiple logistic regression analysis. Stepwise backward and forward methods were used to help the selection of variables. Variables presenting $p < 0.05$ were kept in the final model. Predictive accuracy of the model was determined by the use of C statistic.

In order to develop a practical score, identified variables were given different weights according to respective probabilities of $\beta$ regression coefficient. The score was calculated for each patient. The population was divided into four categories: very low, low, intermediate, and high risk for the occurrence of the combination of death or (re)infarction within 30 days.

Research design flowchart can be found in Figure 1. Statistical analysis was carried out using SPSS for Windows, Version 13.0 (SPSS Institute, Chicago, Illinois).

**Results**

**Patients’ Characteristics, Treatment and Course**

One thousand and twenty nine (1,029) patients were included in the study population. Two patients were lost to follow-up. Therefore, study population included a total of one thousand and twenty-seven (1,027) patients. Table 1 shows a summary of study population baseline characteristics. Five hundred and eighty-nine were males (57.4%), and mean age was 61.55 years of age ($\pm 0.35$). Most frequent risk factor for coronary artery disease (CAD) was systemic arterial hypertension followed by dyslipidemia. At admission, 258 patients (25.1%) presented non-ST-segment elevation acute myocardial infarction; 744 (72.4%) presented unstable angina III B; and 25 (2.4%), unstable angina III C in Braunwald’s classification.

Patients were intensely medicated with beta blocker (93.0%), salicylic acetyl acid (97.5%), IV nitroglycerin (94.3%), antithrombinics (84.3%), tienopiridinics (89.5%), angiotensin converting enzyme inhibitors (ACEI [84.1%]) and statin (94.4%).

Cinecoronariography was performed in 734 patients (71.5%). In the population as a whole, PCI was the indication for 276 patients (26.9%), and CABG surgery for 141 (13.7%). When analyzing only the patients who had been submitted to cinecoronariography in the ongoing hospitalization, PCI was indicated for 259 of them (35.3%), and CABG surgery for 114 (15.5%). The procedure was performed in the first in-hospital period in 254 patients (92%) and for 101 patients (71.6%) respectively for those treated with PCI and CABG surgery.

Twenty-one patients died in hospital (2.0%) and 23 (2.2%) had (re)infarction. The combined outcome - death or (re)infarction within 30 days - was reported for 54 patients (5.3%).
Data Exploratory Analysis

Table 1 shows data on the results of exploratory analysis of clinical, electrocardiographic and laboratory variables. Many of the variables were associated to the risk of the combined outcome in this analysis.

Multiple Logistic Regression Analysis

In order to identify independent prognostic variables, a multiple regression analysis was performed with variables for a 10% significance level in the exploratory analysis. Gender adjustment was kept in the analysis. The variables that follow have not shown statistic significance in the multiple logistic regression analysis: gender; current smoking habit; previous stable angina; peripheral artery disease; CAD ≥ 50%; heart rate; hematocrit; hemoglobin; total leukocyte count; hs - CRP; and ST-segment depression.

Although not statistically significant, ST-segment depression was kept in the final model due to its clinical significance. That was seen as the result of the multicollinearity between ST-segment depression and cTnl. The following prognostic variables have been identified: increased age (odds ratio [OR] 1.06; confidence interval [CI] 95% 1.03 – 1.09; p < 0.001); previous history of diabetes mellitus (OR 1.90; CI 95% 1.05 – 3.45; p = 0.03); prior stroke (OR 3.46; CI 95% 1.43 – 8.40; p = 0.01); previous use of ACEI (OR 0.57; CI 95% 0.31 – 1.02; p = 0.05); elevation of cTnl (OR 2.06; CI 95% 1.12 – 3.78; p = 0.001); elevation of creatinine (OR 1.58; CI 95% 1.17 – 2.12; p = 0.003); ST-segment depression (OR 1.54; CI 95% 0.83 – 2.83; p = 0.16).

In order to verify the occurrence of multicolinearity between ST-segment depression and elevation of cTnl two multiple logistic regression models were performed. In one of them cTnl was not included. The results were the following: increased age (OR 1.06; CI 95% 1.03 –1.09; p < 0.001); previous history of diabetes mellitus (OR 1.93; CI 95% 1.07 – 3.49; p = 0.02); prior stroke (OR 3.14; CI 95% 1.43 – 8.14; p = 0.006); previous use of ACEI (OR 0.58; CI 95% 0.30 – 0.97; p
Table 1 - Baseline Characteristics and Exploratory Analysis of Potential Determinants for the Combined Outcome of Death or (Re)Infarction within 30 days.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All patients (n = 1,027)</th>
<th>With combined outcome (n = 54)</th>
<th>With no combined outcome (n = 973)</th>
<th>Odds ratio [CI 95%]</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic and Clinical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age in years*</td>
<td>61.55 (± 0.35)</td>
<td>68.56 (±1.47)</td>
<td>61.16 (±0.35)</td>
<td>1.06 [1.04-1.09]</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Males, n (%)</td>
<td>589 (57.4)</td>
<td>34 (62.9)</td>
<td>555 (57.0)</td>
<td>1.28 [0.73-2.26]</td>
<td>0.39</td>
</tr>
<tr>
<td>Two or more pain episodes in the last 24 hours, n (%)</td>
<td>724 (70.5)</td>
<td>41 (75.9)</td>
<td>683 (70.1)</td>
<td>1.34 [0.71-2.54]</td>
<td>0.37</td>
</tr>
<tr>
<td>Smoking habits, n (%)</td>
<td>213 (20.7)</td>
<td>5 (9.2)</td>
<td>208 (21.3)</td>
<td>0.38 [0.15-0.95]</td>
<td>0.03</td>
</tr>
<tr>
<td>Diabetes mellitus, n (%)</td>
<td>329 (32.0)</td>
<td>26 (48.1)</td>
<td>303 (31.1)</td>
<td>2.05 [1.18-3.56]</td>
<td>0.01</td>
</tr>
<tr>
<td>Hypertension, n(%)</td>
<td>787 (76.0)</td>
<td>42 (77.7)</td>
<td>745 (76.5)</td>
<td>1.07 [0.55-2.07]</td>
<td>0.84</td>
</tr>
<tr>
<td>Dyslipidemia, n (%)</td>
<td>659 (64.2)</td>
<td>33 (61.1)</td>
<td>626 (64.3)</td>
<td>0.87 [0.50-1.53]</td>
<td>0.63</td>
</tr>
<tr>
<td>Family history of premature CAD, n (%)</td>
<td>395 (38.5)</td>
<td>20 (37.0)</td>
<td>375 (38.5)</td>
<td>0.94 [0.53-1.65]</td>
<td>0.82</td>
</tr>
<tr>
<td>Three or more risk factors for CAD, n (%)</td>
<td>465 (45.3)</td>
<td>24 (44.4)</td>
<td>441 (45.3)</td>
<td>0.97 [0.56-1.68]</td>
<td>0.89</td>
</tr>
<tr>
<td>Previous stable angina, n (%)</td>
<td>312 (30.4)</td>
<td>22 (40.7)</td>
<td>290 (29.8)</td>
<td>1.62 [0.93-2.83]</td>
<td>0.09</td>
</tr>
<tr>
<td>Previous myocardial infarction, n (%)</td>
<td>451 (43.9)</td>
<td>21 (38.8)</td>
<td>430 (44.1)</td>
<td>0.80 [0.46-1.41]</td>
<td>0.44</td>
</tr>
<tr>
<td>Peripheral artery disease, n (%)</td>
<td>52 (5.1)</td>
<td>6 (11.1)</td>
<td>46 (4.7)</td>
<td>2.52 [1.03-6.19]</td>
<td>0.05</td>
</tr>
<tr>
<td>Previous stroke, n (%)</td>
<td>56 (5.5)</td>
<td>8 (14.8)</td>
<td>48 (4.9)</td>
<td>3.35 [1.50-7.50]</td>
<td>0.007</td>
</tr>
<tr>
<td>Previous CAD ≥ 50%, n (%)</td>
<td>584 (56.9)</td>
<td>37 (68.5)</td>
<td>547 (56.2)</td>
<td>1.70 [0.94-3.05]</td>
<td>0.07</td>
</tr>
<tr>
<td>Previous percutaneous coronary intervention, n (%)</td>
<td>311 (30.2)</td>
<td>16 (29.6)</td>
<td>295 (30.3)</td>
<td>0.97 [0.53-1.76]</td>
<td>0.91</td>
</tr>
<tr>
<td>Previous coronary artery bypass graft surgery, n (%)</td>
<td>231 (22.4)</td>
<td>13 (24.0)</td>
<td>218 (22.4)</td>
<td>1.10 [0.58-2.09]</td>
<td>0.77</td>
</tr>
<tr>
<td>Previous medications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Betablocker, n (%)</td>
<td>591 (57.5)</td>
<td>29 (53.7)</td>
<td>562 (57.7)</td>
<td>0.85 [0.49-1.47]</td>
<td>0.55</td>
</tr>
<tr>
<td>Aspirin, n (%)</td>
<td>729 (71.0)</td>
<td>40 (74.0)</td>
<td>689 (70.8)</td>
<td>1.18 [0.63-2.20]</td>
<td>0.60</td>
</tr>
<tr>
<td>Statin, n (%)</td>
<td>466 (45.4)</td>
<td>25 (46.2)</td>
<td>441 (45.3)</td>
<td>1.04 [0.60-1.80]</td>
<td>0.89</td>
</tr>
<tr>
<td>ACEI, n (%)</td>
<td>577 (56.2)</td>
<td>24 (44.4)</td>
<td>553 (56.8)</td>
<td>0.61 [0.35-1.06]</td>
<td>0.07</td>
</tr>
<tr>
<td>Killip-Class &gt; I, n (%)</td>
<td>14 (1.3)</td>
<td>2 (3.7)</td>
<td>12 (1.2)</td>
<td>3.08 [0.67-14.12]</td>
<td>0.16</td>
</tr>
<tr>
<td>Heart rate (bpm) *</td>
<td>74.43 (± 0.41)</td>
<td>77.46 (±2.06)</td>
<td>74.26 (±0.49)</td>
<td>1.02 [1.00-1.04]</td>
<td>0.08</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg) *</td>
<td>141.00 (± 0.84)</td>
<td>140.26 (±3.40)</td>
<td>141.04 (±0.86)</td>
<td>1.00 [0.99-1.01]</td>
<td>0.83</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg) *</td>
<td>85.2 (± 0.47)</td>
<td>83.28 (±2.20)</td>
<td>85.31 (±0.48)</td>
<td>0.99 [0.97-1.01]</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Electrocardiographic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST-segment depression ≥ 0.5 mm in at least one lead, except for aVR, n (%)</td>
<td>268 (26.0)</td>
<td>24 (44.4)</td>
<td>244 (25.0)</td>
<td>2.39 [1.37-4.17]</td>
<td>0.002</td>
</tr>
<tr>
<td>Inversion of T wave ≥ 1 mm in two contiguous leads, n (%)</td>
<td>378 (36.8)</td>
<td>25 (46.2)</td>
<td>353 (36.2)</td>
<td>1.51 [0.87-2.62]</td>
<td>0.14</td>
</tr>
<tr>
<td>Pathologic Q waves, n (%)</td>
<td>243 (23.6)</td>
<td>14 (25.9)</td>
<td>229 (23.5)</td>
<td>1.14 [0.61-2.13]</td>
<td>0.68</td>
</tr>
<tr>
<td><strong>Laboratory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>40.68 (±0.14)</td>
<td>39.57 (±0.70)</td>
<td>40.74 (±0.15)</td>
<td>0.95 [0.89-1.00]</td>
<td>0.06</td>
</tr>
<tr>
<td>Hemoglobin (g/dl) *</td>
<td>13.89 (± 0.05)</td>
<td>13.47 (±0.25)</td>
<td>13.91 (±0.05)</td>
<td>0.84 [0.71-1.00]</td>
<td>0.04</td>
</tr>
<tr>
<td>Blood glucose level (mg/dl) *</td>
<td>121.51 (± 1.88)</td>
<td>123.91 (±7.60)</td>
<td>121.38 (±1.94)</td>
<td>1.00 [1.00-1.01]</td>
<td>0.76</td>
</tr>
<tr>
<td>Leukocytes (×10³/mm³) *</td>
<td>7.98 (± 0.08)</td>
<td>8.61 (±0.44)</td>
<td>7.94 (±0.08)</td>
<td>1.09 [0.99-1.19]</td>
<td>0.07</td>
</tr>
<tr>
<td>Creatinine (mg/dl) *</td>
<td>1.13 (± 0.02)</td>
<td>1.66 (±0.21)</td>
<td>1.11 (±0.02)</td>
<td>2.04 [1.50-2.77]</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Elevation of cardiac troponin I, n (%)</td>
<td>304 (29.6)</td>
<td>29 (53.7)</td>
<td>275 (28.2)</td>
<td>2.94 [1.69-5.12]</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>hs - CRP &gt; 0.8 mg/dl, n (%)</td>
<td>480 (46.7)</td>
<td>34 (63.0)</td>
<td>446 (45.8)</td>
<td>2.00 [1.14-3.53]</td>
<td>0.01</td>
</tr>
</tbody>
</table>

n = number of patients; CAD = coronary artery disease; ACEI = angiotensin converting enzyme inhibitor; hs - CRP = high sensitivity C-reactive protein; CI = confidence interval. *Quantitative variables are expressed as mean ± standard error.
Table 2 - Multiple logistic regression model for Dante Pazzanese risk score

<table>
<thead>
<tr>
<th>Variables</th>
<th>β - coefficient</th>
<th>Odds ratio CI 95%</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing age in years</td>
<td>0.058</td>
<td>1.06 [1.03-1.09]</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Males</td>
<td>0.075</td>
<td>1.08 [0.58-1.99]</td>
<td>0.81</td>
</tr>
<tr>
<td>History of diabetes mellitus</td>
<td>0.668</td>
<td>1.95 [1.07-3.54]</td>
<td>0.02</td>
</tr>
<tr>
<td>Prior stroke</td>
<td>1.247</td>
<td>3.48 [1.43-8.43]</td>
<td>0.006</td>
</tr>
<tr>
<td>Previous use of ACEI</td>
<td>-0.564</td>
<td>0.57 [0.31-1.02]</td>
<td>0.05</td>
</tr>
<tr>
<td>Without elevation in cardiac troponin I and without ST-segment depression</td>
<td>-----</td>
<td>-----</td>
<td>0.02</td>
</tr>
<tr>
<td>Without elevation in cardiac troponin I and with ST-segment depression</td>
<td>0.661</td>
<td>1.94 [0.82-4.59]</td>
<td>0.13</td>
</tr>
<tr>
<td>With elevation in cardiac troponin I and without ST-segment depression</td>
<td>0.910</td>
<td>2.48 [1.13-5.45]</td>
<td>0.02</td>
</tr>
<tr>
<td>With elevation in cardiac troponin I and with ST-segment depression</td>
<td>1.132</td>
<td>3.10 [1.42-6.77]</td>
<td>0.005</td>
</tr>
<tr>
<td>Elevation of creatinine</td>
<td>0.452</td>
<td>1.57 [1.16-2.11]</td>
<td>0.003</td>
</tr>
<tr>
<td>Constant</td>
<td>-7.886</td>
<td>-----</td>
<td>-----</td>
</tr>
</tbody>
</table>

CI = Confidence interval; ACEI = angiotensin converting enzyme inhibitor; ST-segment depression was represented by depression ≥ 0.5 mm in at least one lead, except for aVR.
Dante Pazzanese Risk Score for Non-ST-Segment Elevation Acute Coronary Syndrome

Clinical History

1) Age in years
   - <40: 0
   - 40<50: 1
   - 50<60: 2
   - 60<70: 3
   - 70<80: 4
   - 80<90: 7
   - ≥90: 9

2) Past History
   - Diabetes mellitus: 2
   - Stroke: 4

Previous medication
   - Non-use of ACEI: 1

4) Cardiac troponin I and ECG
   - Without elevation in cardiac troponin I and without ST-segment depression: 0
   - Without elevation in cardiac troponin I and with ST-segment depression: 1
   - With elevation in cardiac troponin I and without ST-segment depression: 3
   - With elevation in cardiac troponin I and with ST-segment depression: 4

5) Serum creatinine (mg/dl)
   - <1: 0
   - 1<2: 1
   - 2<4: 4
   - ≥4: 10

Total sum of points in each item

1) ___________________________
2) ___________________________
3) ___________________________
4) ___________________________
5) ___________________________

Total risk score

(0 to 30 points)

Probability of combined event within 30 days

Figure 2 - Dante Pazzanese risk score and nomogram for the probability of death or (re)infarction events within 30 days. ACEI = angiotensin converting enzyme inhibitor; ECG = electrocardiogram.

significance level. In TIMI² risk score variables were selected with significance level < 20%. In GRACE¹¹ risk score variables were selected with significance level < 25%.

Advanced age showed to be constantly associated to adverse events in a number of studies²,⁴,¹¹. Stone et al¹² have demonstrated that age has remained an independent prognosis factor for death, infarction or recurrent ischemia within six weeks after an episode of non-ST-segment elevation acute coronary syndrome. In the Dante Pazzanese risk score age was kept in the final model as prognostic variable. It was accounted for through distinctive points in regard to the probabilities of the combined event for

Figure 3 - Internal Validation of Dante Pazzanese risk score.

Figure 4 - Areas under ROC (receiver operating characteristic) curve for the probability of death or (re)infarction within 30 days, and of Dante Pazzanese risk score.
those clinical conditions affect chronic CAD patients negatively. In the OPUS TIMI 16 study, investigators concluded that patients with both acute coronary syndrome and extracardiac vascular disease show an association with more severe CAD and worse outcomes. Those patients have probably received less aggressive treatment, which partially explains the higher occurrence of adverse outcomes. In the Dante Pazzanese risk score, previous stroke was considered a factor for worse prognosis, having been kept in the final model. A history of peripheral artery disease was shown to be a prognostic variable in the exploratory analysis but not in the multiple logistic regression analysis.

Previous use of ACEI was a predictive variable for better prognosis, strongly pointing towards favorable results. Reports on the use of ACEI by patients with stable CAD under heart failure condition and left ventricle dysfunction have been published elsewhere. Metaanalysis from three prestigious studies has demonstrated that this drug class also reduces major cardiovascular events in atherosclerotic patients with no evidence of left ventricle systolic dysfunction or heart failure. The Dante Pazzanese risk score identified non-administration of ACEI prior to hospital admission as a factor for event occurrence.

The use of ST-segment depression ≥ 0.5mm was based on previous reports. At a first moment, ST-segment depression was not observed to be a prognostic variable at 5% significance level. That allowed the assessment of the possibility of multicollinearity between cTnI and ST-segment depression, through a separate analysis of two independent models – those variables were not included in one of them. ST-segment depression emerges as an independent variable when cTnI is not included in the model. The phenomenon may not have been observed in previous models due to the fact that those variables are part of the inclusion criteria for the study population, thus making it easier to keep them in the final model. In the present study the authors chose to include the combination between the two variables, considering that one potentializes the effect of the other.

In patients under acute chest pain, high levels of cTnI within the first 24 hours have been associated to the risk for acute myocardial infarction and of major cardiac events. In the Dante Pazzanese risk score, cTnI increase showed to be an independent variable for worse prognosis.

Renal dysfunction is recognized as high risk for acute coronary syndrome patients. It has proven to be a prognostic variable in one of the models published. In the Dante Pazzanese risk score the absolute value of creatinine accumulation was an independent prognostic variable for worse prognosis. For better applicability, it was categorized in risk ranges. The higher creatinine accumulation the higher the probability of unfavorable results.

The Dante Pazzanese risk score reported good performance, thus justifying its applicability. It should be calculated at hospital admission and updated during hospital stay. It may be used for therapeutic decision-making. As any other risk stratification model, it should be subject to future reassessment, so that existing variables can be re-analyzed and new variables may be incorporated.

Study Limitations

The present study presents some limitations. The cTnI was assessed as qualitative variable. Quantitative analysis would imply an assessment of myocardial necrosis extension for the risk of adverse events. Serial ECG recordings were not obtained. The analysis of ischemic changes that may occur in other ECG recordings after the baseline ECG provides valuable data to be investigated and that could predict potentially unfavorable outcomes. The Dante Pazzanese risk score should not be applied to patients with changes confounding the ECG pattern (pacemaker rhythm, atrial fibrillation rhythm, bundle branch block). This group of patients would need new statistical analysis for the selection of specific prognostic variables.

Conclusion

An easy-to-use risk stratification score was developed in a brazilian population with non-ST-segment elevation acute coronary syndrome. Easily applicable, it holds high predictive value for cardiovascular events. It may serve as source of information for medical teams, and for patients and their familiers as relevant prognostic assessment.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This article is part of the thesis of doctoral submitted by Elizabete Silva dos Santos, from Instituto do Coração (InCor); Hospital das Clínicas – Faculdade de Medicina da Universidade de São Paulo.
References


