Emergency Service Admission Time and In-Hospital Mortality in Acute Coronary Syndrome

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Abstract

Background: The relationship between admission time to an emergency service and in-hospital outcomes in acute coronary syndrome (ACS) is controversial. Admission during off-hours would be associated with worse prognosis.

Objective: To assess the influence of admission time on prolonged hospitalization and mortality for ACS patients, regarding regular hours (7AM-7PM) and off-hours (7PM-7AM).

Methods: The study assessed prospectively 1,104 consecutive ACS patients. In-hospital mortality and length of hospital stay ≥ 5 days were the outcomes analyzed.

Results: Admission during regular hours was greater as compared with that during off-hours (63% vs. 37%; p < 0.001). Unstable angina was more prevalent during regular hours (43% vs. 32%; p < 0.001), while non-ST-segment elevation myocardial infarction (NSTEMI) was during off-hours (33% vs. 43%; p = 0.001). Differences in neither mortality nor length of hospital stay were observed in the time periods studied. Predictive factors for length of hospital stay ≥ 5 days were as follows: age [OR 1.042 (95%CI: 1.025 – 1.058), p < 0.001]; ejection fraction (EF) [OR 0.977 (95%CI: 0.966 – 0.988), p < 0.001]; NSTEMI [OR 1.699 (95%CI: 1.221 – 2.366), p = 0.001]; and smoking [OR 1.723 (95%CI: 1.113 – 2.668), p = 0.014]. Predictive factors for in-hospital mortality were as follows: age [OR 1.090 (95%CI: 1.047 – 1.134), p < 0.001]; EF [OR 0.936 (95%CI: 0.909 – 0.964), p < 0.001]; and surgical treatment [OR 3.781 (95%CI: 1.374 – 10.409), p = 0.01].

Conclusion: Prolonged length of hospital stay and in-hospital mortality in ACS patients do not depend on admission time.

Keywords: Hospitalization, patient admission, time factors, first aid/mortality, myocardial infarction.
The following patients’ characteristics were assessed: presence of classical risk factors for coronary artery disease (CAD); use of medications; preliminary laboratory tests; time of presentation to the ES; number of coronary arteries affected; treatment; length of hospital stay; and in-hospital mortality.

The time of admission to the ES was categorized according to the time of arrival to the ES as follows: regular hours (7AM to 7PM) and off-hours (7PM to 7AM). The risk factors for CAD were as follows: smoking; diabetes mellitus; systemic arterial hypertension; dyslipidemia; and family history of CAD. Regarding presentation, the ACS was classified as follows: unstable angina (UA); non-ST-segment elevation myocardial infarction (NSTEMI); and ST-segment elevation myocardial infarction (STEMI). In addition, laboratory tests, echocardiogram, use of medications during hospitalization, and coronary angiography were assessed. Coronary artery lesion was considered in the presence of at least a 50% reduction in the lumen of major epicardial coronary arteries. The treatment used was characterized as follows: clinical; angioplasty with stent placement; and coronary artery bypass graft surgery. A length of hospital stay ≥ 5 days was considered long, according to previous studies. The primary objective of this study was to assess the influence of the admission time of ACS patients on inhospital mortality. The secondary objective was to assess the length of hospital stay and type of treatment used (clinical, surgical, or angioplasty).

Statistical analysis

Categorical and continuous variables were analyzed by use of the chi-square and Student t tests, respectively. In-hospital mortality was assessed by use of Kaplan-Meyer curves and stratified according to the admission periods. For multivariate analysis, logistic regression and stepwise model were used, with inclusion and permanence of variables with p < 0.05. However, death was the dependent variable adjusted for: (1) presentation to the ES during regular hours or off-hours; (2) age; (3) presence of arterial hypertension; (4) presence of smoking; (5) familial history of dyslipidemia; (6) familial history of diabetes; (7) familial history of CAD; (8) sex; (9) type of ACS (UA, NSTEMI, and STEMI); (10) ejection fraction (EF); and (11) type of treatment (clinical, surgical, or angioplasty). The same model and independent variables were used for a second multivariate analysis, the length of hospital stay being the dependent variable (< 5 or ≥ 5 days). The level of statistical significance adopted was p < 0.05. The SAS software, version 9.2, was used.

Results

The patients’ clinical and laboratory characteristics are shown in Table 1. The mean and median length of hospital stay were 5.1 ± 8.0 days and 3 days, respectively. On univariate analysis, the presentation during regular hours showed: a higher prevalence of dyslipidemias (48% vs. 42%; p = 0.043); higher BMI (26.9 vs. 26.3 kg/m²; p = 0.043); lower diastolic blood pressure (87.6 vs. 89.9 mmHg; p = 0.047); lower total white blood cell count (9,120 vs. 9,628 cells/mm³; p = 0.016); higher sodium levels (139.5 vs. 139.9 mEq/L; p = 0.032); and lower levels of total cholesterol (179.0 vs. 186.8 mg/dL; p = 0.042) and LDL-cholesterol (105.9 vs. 112.5 mg/dL; p = 0.048). Considering patients with UA or NSTEMI, 92% used clopidogrel or glycoprotein Ib/IIa inhibitor before the angiographic study. Table 2 shows the diagnoses, the result of cardiac catheterization with blocked coronary arteries, and the outcomes death and length of hospital stay ≥ 5 days. Higher prevalence of UA (42.6% vs. 31.9%; p < 0.001) and lower prevalence of NSTEMI (33.4% vs. 43.3%; p = 0.001) were observed during regular hours. Regarding the blocked coronary artery, the anterior descending artery (32.7%) was more often affected than the right coronary (23.9%) and circumflex (20.9%) arteries. The diagonal artery (7.4%), saphenous vein grafts (2.3%) and left main coronary artery (1.8%) were less frequently affected. No difference was observed in the following: medications used; the blocked coronary artery type of treatment for ACS; and the outcomes death (3.4% vs. 4.7%; p = 0.292) and length of hospital stay ≥ 5 days (23.3% vs. 25.7%; p = 0.358).

Table 3 shows the variables identified, on multivariate analysis, as independent factors related to the length of hospital stay ≥ five days as follows: age (OR = 1.042; p < 0.001); EF (OR = 0.977; p < 0.001); NSTEMI (OR = 1.699; p < 0.001); and smoking (OR = 1.723; p = 0.014). The independent factors related to in-hospital death were as follows: age (OR = 1.090; p < 0.001); EF (OR = 0.936; p < 0.001); and surgical treatment (OR = 3.781; p = 0.01). No correlation was observed between the time of admission to the ES and the ACS presentation type (p = 0.636). Dividing patients according to ACS presentation, the results for in-hospital mortality were similar when the same model was used. For patients with UA (n = 427), in-hospital mortality related to higher age (OR = 1.155; 95% CI = 1.029 – 1.297; p = 0.015), while for those with STEMI (n = 409) in-hospital mortality related to lower age (OR = 1.087; 95% CI = 1.029 – 1.149; p = 0.003) and lower EF (OR = 0.924; 95% CI = 0.886 – 0.962; p < 0.001). For patients with STEMI (n = 268), no independent risk factor for in-hospital mortality was identified.

Table 4 shows the effects of the following variables on mortality and length of hospital stay ≥ 5 days: age over or under 65 years; ACS presentation; treatment type; and EF greater or lower than 50%. Mortality was higher in the following patients: elderly (7.0% vs. 1.9%; p < 0.001); patients with STEMI (6.0% vs. 3.5% vs. 1.6%, as compared with NSTEMI and UA, respectively; p < 0.001); and patients requiring coronary artery bypass graft surgery in the same hospitalization (9.4% vs. 3.5% vs. 3.5%, as compared with angioplasty and clinical treatment, respectively; p < 0.001); patients with EF lower than 50% (7.6% vs. 1.9%; p < 0.001). The length of hospital stay ≥ 5 days was more common among patients with the following characteristics: age ≥ 65 years (32.4% vs. 19.0%; p < 0.001); NSTEMI (32.8% vs. 23.1% vs. 16.6%, as compared with STEMI and UA, respectively; p < 0.001); surgery (81.2% vs. 24.5% vs. 15.2%, as compared with angioplasty and clinical treatment, respectively; p < 0.001); and EF lower than 50% (39.8% vs. 27.1%; p < 0.001).

Figure 1 depicts the Kaplan-Meyer curve evidencing similar in-hospital mortality (log-rank; p = 0.317) for regular-hour and off-hour admissions.
<table>
<thead>
<tr>
<th>Factor</th>
<th>All patients</th>
<th>Regular hours</th>
<th>Off-hours</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients, n (%)</td>
<td>1,104 (100%)</td>
<td>700 (63.4)</td>
<td>404 (36.6)</td>
<td></td>
</tr>
<tr>
<td>Age (years)*</td>
<td>61.3 (±11.8)</td>
<td>61.3 (±11.7)</td>
<td>61.3 (±12.1)</td>
<td>0.934</td>
</tr>
<tr>
<td>Male sex, n (%)</td>
<td>670 (60.7)</td>
<td>434 (62.0)</td>
<td>236 (58.4)</td>
<td>0.240</td>
</tr>
<tr>
<td>Age &gt; 65 years, n (%)</td>
<td>429 (38.9)</td>
<td>270 (38.6)</td>
<td>159 (39.4)</td>
<td>0.796</td>
</tr>
<tr>
<td>Risk factors, n (%)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Previous coronary disease</td>
<td>554 (50.2)</td>
<td>350 (50.1)</td>
<td>204 (50.5)</td>
<td>0.892</td>
</tr>
<tr>
<td>Arterial hypertension</td>
<td>876 (79.3)</td>
<td>564 (80.6)</td>
<td>312 (77.2)</td>
<td>0.186</td>
</tr>
<tr>
<td>Smoking</td>
<td>250 (22.6)</td>
<td>156 (22.3)</td>
<td>94 (23.3)</td>
<td>0.707</td>
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<tr>
<td>Dyslipidemia</td>
<td>506 (45.8)</td>
<td>337 (48.1)</td>
<td>169 (41.8)</td>
<td>0.043</td>
</tr>
<tr>
<td>Diabetes</td>
<td>352 (31.2)</td>
<td>229 (32.7)</td>
<td>123 (30.5)</td>
<td>0.436</td>
</tr>
<tr>
<td>Family history of coronary disease</td>
<td>179 (16.2)</td>
<td>111 (15.9)</td>
<td>68 (16.8)</td>
<td>0.672</td>
</tr>
<tr>
<td>Physical examination*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body mass index</td>
<td>26.7 (±4.3)</td>
<td>26.9 (±4.2)</td>
<td>26.3 (±4.6)</td>
<td>0.043</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>142.8 (±29.4)</td>
<td>141.7 (±28.1)</td>
<td>144.9 (±31.4)</td>
<td>0.090</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>88.4 (±17.3)</td>
<td>87.6 (±15.8)</td>
<td>89.9 (±19.5)</td>
<td>0.047</td>
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<tr>
<td>Laboratory tests*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>13.0 (±1.8)</td>
<td>13.9 (±1.7)</td>
<td>13.8 (±1.8)</td>
<td>0.617</td>
</tr>
<tr>
<td>Leukocytes (mm3)</td>
<td>9,370.4 (±3,317.8)</td>
<td>9,120.4 (±3,207.7)</td>
<td>9,628.4 (±3,479.6)</td>
<td>0.016</td>
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<tr>
<td>Monocytes (%)</td>
<td>8.6 (±3.0)</td>
<td>8.7 (±8.4)</td>
<td>8.3 (±2.7)</td>
<td>0.086</td>
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<tr>
<td>Platelets (mm3)</td>
<td>236,030.8 (±69,436.9)</td>
<td>235,461 (±67,227.3)</td>
<td>237,008 (±64,361.9)</td>
<td>0.720</td>
</tr>
<tr>
<td>Sodium (meq/L)</td>
<td>139.6 (±3.2)</td>
<td>139.5 (±3.2)</td>
<td>139.9 (±3.3)</td>
<td>0.032</td>
</tr>
<tr>
<td>Potassium (meq/L)</td>
<td>4.6 (±0.6)</td>
<td>4.6 (±0.6)</td>
<td>4.6 (±0.6)</td>
<td>0.720</td>
</tr>
<tr>
<td>Creatine (mg/dL)</td>
<td>1.2 (±1.2)</td>
<td>1.3 (±1.4)</td>
<td>1.2 (±0.7)</td>
<td>0.065</td>
</tr>
<tr>
<td>Creatine kinase MB (CKMB) peak (ng/mL)</td>
<td>55.9 (±101.3)</td>
<td>52.9 (±100.0)</td>
<td>60.8 (±103.2)</td>
<td>0.223</td>
</tr>
<tr>
<td>Troponin I (ng/mL)</td>
<td>20.7 (±40.4)</td>
<td>18.8 (±38.8)</td>
<td>23.8 (±42.9)</td>
<td>0.057</td>
</tr>
<tr>
<td>Total cholesterol (mg/dL)</td>
<td>181.6 (±50.1)</td>
<td>179.0 (±50.3)</td>
<td>186.8 (±49.6)</td>
<td>0.042</td>
</tr>
<tr>
<td>HDL-cholesterol (mg/dL)</td>
<td>42.7 (±12.7)</td>
<td>42.6 (±12.9)</td>
<td>43.1 (±12.3)</td>
<td>0.606</td>
</tr>
<tr>
<td>LDL-cholesterol (mg/dL)</td>
<td>108.1 (±41.1)</td>
<td>105.9 (±38.8)</td>
<td>112.5 (±44.8)</td>
<td>0.048</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
<td>156.9 (±95.4)</td>
<td>154.5 (±100.8)</td>
<td>161.6 (±83.9)</td>
<td>0.312</td>
</tr>
<tr>
<td>Glycemia (mg/dL)</td>
<td>131.4 (±62.5)</td>
<td>130.1 (±62.2)</td>
<td>133.7 (±63.0)</td>
<td>0.413</td>
</tr>
<tr>
<td>Ejection fraction on echocardiogram (%)†</td>
<td>53.0 (±14.6)</td>
<td>53.1 (±14.7)</td>
<td>53 (±14.5)</td>
<td>0.910</td>
</tr>
<tr>
<td>Drugs, n (%)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Nitrates</td>
<td>811 (76.1)</td>
<td>512 (75.7)</td>
<td>298 (76.7)</td>
<td>0.733</td>
</tr>
<tr>
<td>ASA</td>
<td>991 (93.2)</td>
<td>630 (93.3)</td>
<td>361 (93)</td>
<td>0.855</td>
</tr>
<tr>
<td>Statins</td>
<td>580 (54.4)</td>
<td>363 (53.7)</td>
<td>217 (55.5)</td>
<td>0.569</td>
</tr>
<tr>
<td>Angiotensin-converting enzyme inhibitors</td>
<td>599 (56.1)</td>
<td>385 (56.6)</td>
<td>214 (54.9)</td>
<td>0.527</td>
</tr>
<tr>
<td>Glycoprotein IIb/IIIa inhibitor</td>
<td>464 (43.6)</td>
<td>285 (42.3)</td>
<td>179 (45.8)</td>
<td>0.267</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>303 (28.4)</td>
<td>193 (28.5)</td>
<td>110 (28.4)</td>
<td>0.956</td>
</tr>
<tr>
<td>Unfractionated heparin</td>
<td>449 (42.1)</td>
<td>272 (40.2)</td>
<td>177 (45.5)</td>
<td>0.091</td>
</tr>
<tr>
<td>Low-molecular-weight heparin</td>
<td>367 (34.3)</td>
<td>236 (34.8)</td>
<td>131 (33.5)</td>
<td>0.665</td>
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<tr>
<td>Diuretics</td>
<td>105 (9.8)</td>
<td>65 (9.6)</td>
<td>40 (10.2)</td>
<td>0.733</td>
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<tr>
<td>Fibrinolytics</td>
<td>19 (1.8)</td>
<td>11 (1.6)</td>
<td>8 (2.0)</td>
<td>0.613</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>71 (6.6)</td>
<td>46 (6.8)</td>
<td>25 (6.4)</td>
<td>0.800</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>813 (73.6)</td>
<td>512 (73.1)</td>
<td>301 (74.5)</td>
<td>0.621</td>
</tr>
</tbody>
</table>

*Continuous variables are shown as mean ± standard deviation; † ejection fraction available in 723 patients.
Discussion

In this study, no influence of the time of admission to the ES was observed on in-hospital mortality of patients with ACS. Ting et al \(^9\) have reported that admission during off-hours can increase the delay time, because of the reduced size of the health care teams \(^9\). Usually, catheterization laboratories offer only on-call services during off-hours. The amount of time between a patient’s arrival at the ES and the time the blocked artery is opened, the so-called “door-to-balloon time” in primary angioplasty or “door-to-needle time” in fibrinolysis, can be compromised during off-hours, and fibrinolylitics are preferred to primary angioplasty for STEMI. Although it has not been established that the early invasive strategy results in lower mortality in NSTEMI, some clinically or hemodynamically unstable patients can benefit from that procedure\(^8,10\). The baseline clinical characteristics of the patients studied were similar, except for the higher prevalence of UA for arrival during regular hours, and of NSTEMI for arrival during off-hours. This might be due to the fact that, during regular hours, patients with less specific symptoms can more easily seek the ES for assessment. The outcomes were also similar for the regular-hour and off-hour arrivals, and the major independent factors for death were as follows: higher age; lower left ventricular EF; and higher frequency of coronary artery bypass graft surgery in the same hospitalization\(^11,12\). For the outcome hospitalization ≥ 5 days, the independent variables were as follows: higher age; lower left ventricular EF; presence of smoking; and NSTEMI, which might be related to greater overall severity, because it was more frequent in elderly patients and those with a greater prevalence of previous CAD. The literature about the influence of the admission time on clinical outcomes is conflicting, but temporal and methodological influences can account for such differences. Using the Myocardial Infarction Data Acquisition System (MIDAS) from 1987 to 2002, Kostis et al \(^5\) have assessed admission on weekends, mortality at 30 days being the primary outcome. Comparing with admission on weekdays, the broader analysis adjusted by use of Cox model, for the period from 1999 to 2002, has shown higher mortality from the second day of admission on and at one year for patients admitted on weekends. That might be explained by the lower rate of invasive cardiac procedures on weekends, since those patients underwent fewer coronary angiographies, angioplasties or surgeries on their first day of admission. Magid et al \(^3\) have assessed patients with STEMI of the database of the National Registry of Myocardial Infarction (NRMI), in the period from 1999 to 2002, and compared their admissions during regular hours and off-hours. Patients admitted during off-hours had a longer door-to-balloon time, while door-to-needle time was similar in both groups. The model adjusted for all variables showed higher mortality for patients admitted off-hours; however, when also adjusted for reperfusion time, mortality did not differ. It is worth noting that two-thirds of the patients in that registry were admitted off-hours. Maier et al \(^6\) have assessed, in the Berlin Myocardial Infarction

<table>
<thead>
<tr>
<th>Table 2 - Diagnoses, cardiac catheterization and outcomes of hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
</tr>
<tr>
<td>CAD presentation, n (%)</td>
</tr>
<tr>
<td>Unstable angina</td>
</tr>
<tr>
<td>NSTEMI</td>
</tr>
<tr>
<td>STEMI</td>
</tr>
<tr>
<td>Cardiac catheterization – blocked coronary artery, n (%)†</td>
</tr>
<tr>
<td>Left main coronary artery</td>
</tr>
<tr>
<td>Anterior descending artery</td>
</tr>
<tr>
<td>Diagonal artery</td>
</tr>
<tr>
<td>Right coronary artery</td>
</tr>
<tr>
<td>Circumflex artery</td>
</tr>
<tr>
<td>Saphenous graft</td>
</tr>
<tr>
<td>Treatment, n (%)</td>
</tr>
<tr>
<td>Clinical</td>
</tr>
<tr>
<td>Angioplasty‡</td>
</tr>
<tr>
<td>Surgery‡</td>
</tr>
<tr>
<td>Outcomes, n (%)</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>Hospitalization ≥ 5 days</td>
</tr>
</tbody>
</table>

* Continuous variables are shown as mean ± standard deviation; † some patients have more than one artery affected; ‡ two patients underwent angioplasty and coronary artery bypass graft surgery. CAD - coronary artery disease; NSTEMI - non-ST-segment elevation myocardial infarction; STEMI - ST-segment elevation myocardial infarction.
Figure 1 – In-hospital event-free survival curve comparing regular-hour and off-hour admissions.

Tabela 3 - Fatores independentes para permanência superior ou igual a cinco dias e mortalidade na análise multivariada

<table>
<thead>
<tr>
<th>Factor for length of hospital stay ≥ 5 days</th>
<th>Odds Ratio</th>
<th>Lower limit (95%)</th>
<th>Upper limit (95%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.042</td>
<td>1.025</td>
<td>1.058</td>
<td>&lt; 0.001</td>
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<tr>
<td>Ejection fraction</td>
<td>0.977</td>
<td>0.966</td>
<td>0.988</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>1.699</td>
<td>1.221</td>
<td>2.366</td>
<td>0.015</td>
</tr>
<tr>
<td>Smoking</td>
<td>1.723</td>
<td>1.113</td>
<td>2.668</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Factor for mortality - ACS

<table>
<thead>
<tr>
<th>Factor for mortality - ACS</th>
<th>Odds Ratio</th>
<th>Lower limit (95%)</th>
<th>Upper limit (95%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.09</td>
<td>1.047</td>
<td>1.134</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Ejection fraction</td>
<td>0.936</td>
<td>0.909</td>
<td>0.964</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Surgery</td>
<td>3.781</td>
<td>1.374</td>
<td>10.409</td>
<td>0.01</td>
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Factor for mortality - UA

<table>
<thead>
<tr>
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<th>Odds Ratio</th>
<th>Lower limit (95%)</th>
<th>Upper limit (95%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.155</td>
<td>1.029</td>
<td>1.297</td>
<td>0.015</td>
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</table>

Factor for mortality - NSTEMI

<table>
<thead>
<tr>
<th>Factor for mortality - NSTEMI</th>
<th>Odds Ratio</th>
<th>Lower limit (95%)</th>
<th>Upper limit (95%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.087</td>
<td>1.029</td>
<td>1.149</td>
<td>0.003</td>
</tr>
<tr>
<td>Ejection fraction</td>
<td>0.924</td>
<td>0.886</td>
<td>0.962</td>
<td>&lt; 0.001</td>
</tr>
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</table>

Factor for mortality - STEMI

<table>
<thead>
<tr>
<th>Factor for mortality - STEMI</th>
<th>Odds Ratio</th>
<th>Lower limit (95%)</th>
<th>Upper limit (95%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>* No independent factor</td>
<td></td>
<td></td>
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</tbody>
</table>

NSTEMI - non-ST-segment elevation myocardial infarction; ACS - acute coronary syndrome; UA - unstable angina; STEMI - ST-segment elevation myocardial infarction.
Table 4 - Univariate analysis comparing age, CAD presentation, treatment type, and ejection fraction related to mortality and length of hospital stay ≥ 5 days

<table>
<thead>
<tr>
<th>Factor, n (%)</th>
<th>Death</th>
<th>Length of hospital stay ≥ 5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 65 years</td>
<td>13 (1.9)</td>
<td>128 (19.0)</td>
</tr>
<tr>
<td>≥ 65 years</td>
<td>30 (7.0)</td>
<td>139 (32.4)</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>7 (1.6)</td>
<td>71 (16.6)</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>20 (4.9)</td>
<td>134 (32.8)</td>
</tr>
<tr>
<td>STEMI</td>
<td>16 (6.0)</td>
<td>62 (23.1)</td>
</tr>
<tr>
<td>p</td>
<td>0.007</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Clinical</td>
<td>24 (3.5)</td>
<td>60 (15.2)</td>
</tr>
<tr>
<td>Angioplasty</td>
<td>23 (3.5)</td>
<td>159 (24.5)</td>
</tr>
<tr>
<td>Surgery</td>
<td>6 (9.4)</td>
<td>52 (81.2)</td>
</tr>
<tr>
<td>p</td>
<td>0.019</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Ejection fraction ≥ 50%</td>
<td>9 (1.9)</td>
<td>127 (27.1)</td>
</tr>
<tr>
<td>Ejection fraction &lt; 50%</td>
<td>19 (7.6)</td>
<td>100 (39.8)</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

NSTEMI - non-ST-segment elevation myocardial infarction; STEMI - ST-segment elevation myocardial infarction.

Registry (BMIR), patients with STEMI treated exclusively with primary angioplasty, from 2004 to 2007. Patients admitted during off-hours had a longer door-to-balloon time (79 vs. 90 minutes; p < 0.001) and higher mortality (6.8% vs. 4.3%; p = 0.020). However, in the subgroup of patients cared for at the Medical Emergency Service (prehospital health care service comprising an ambulance and clinician, who contacts the catheterization laboratory team of the closest hospital, and takes the patient directly to the catheterization laboratory), mortality did not differ between regular hours and off-hours (7.2% vs. 5.1%; p = 0.128), even with a longer door-to-balloon time (80 vs. 68 minutes; p < 0.001). Those authors have concluded that the pre-hospital health care service could be a strategy to reduce both door-to-balloon time and mortality. Casella et al. have shown that patients admitted during off-hours had a longer pain-to-balloon time (195 vs. 186 minutes; p = 0.03), but similar mortality (5.8% vs. 7.2%), when angioplasty was performed at the reference center for infarction. Those authors have concluded that, at an efficient STEMI network focused on reperfusion, mortality does not differ according to admission time. Other factors, such as circadian rhythm and treatment outcomes can also contribute to differences between the admission times.

Limitations

Because of limitations in the database, the following variables were not assessed: door-to-balloon time; time between symptom onset and opening of the blocked coronary artery; electrocardiographic alterations; and risk scores. However, we believe that the final outcome (death and length of hospital stay) is the best tool to assess differences between the results of presentation during regular hours and off-hours. Our study was limited to assessing in-hospital outcomes, and did not assess differences over longer periods. This is a single-center study and included simultaneously UA, NSTEMI and STEMI. The morbidity and mortality of those ACS presentations are different, but, for the purpose of assessing differences between admission times, we believed that grouping those presentations would be more informative than the analysis of each component in isolation. Even if the impact of occasional delays on therapy can be greater in STEMI as compared with that in NSTEMI, in our study, we observed no independence in logistic regression for any specific ACS presentation.

Conclusion

In emergency services specialized in interventional care, the prognosis of patients with ACS do not depend on the admission time, but is related to age, systolic ventricular dysfunction, and the need for early coronary artery bypass graft surgery, reflecting the severity of the disease. The length of hospital stay relates to age, systolic ventricular dysfunction, smoking habit, and NSTEMI, factors that also reflect a more extensive CAD. Such results are similar to those of other countries, in services of high cardiological complexity.

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Potential Conflict of Interest

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

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Study Association

This study is not associated with any post-graduation program.

References


