Acute Coronary Syndrome Registry at a Cardiology Emergency Center

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Objective: Describe clinical characteristics of patients (P) admitted to hospital with suspected acute coronary syndrome (ACS), identifying medical treatment and in-hospital mortality.

Methods: Evaluated were 860 patients with ACS from January through December, 2003. We evaluated baseline characteristics, ACS mode of presentation, medication during hospital stay, indication for clinical treatment or myocardial revascularization (MR) and in-hospital mortality.

Results: Five hundred and three (58.3%) were male, mean age 62.6 years (± 11.9). Seventy-eight (9.1%) were discharged with the diagnosis of acute ST-elevation myocardial infarction (STEMI), 238 (27.7%) with non-ST-elevation myocardial infarction (non-STEMI), 516 (60%) with unstable angina (UA), two (0.2%) with atypical manifestations of ACS and 26 (3%) with non-cardiac chest pain. During hospitalization, 87.9% of patients were given a beta-blocker, 95.9% acetylsalicylic acid, 89.9% anti-thrombin therapy, 86.2% intravenous nitroglycerin, 6.4% glycoprotein (GP) IIb/IIIa receptor inhibitor, 35.9% clopidogrel, 77.9% angiotensin-converting enzyme inhibitor, and 70,9% statin drugs. Coronary arteriography was performed in 72 patients (92.3%) with STEMI, and in 452 (59.8%) with non-STEMI ACS ($p < 0.0001$). Myocardial revascularization (MR) surgery was indicated for 12.9% and percutaneous coronary intervention for 26.6%. In-hospital mortality was 4.8%, and no difference was recorded between the proportion of deaths among patients with STEMI and non-STEMI ACS (6.4% versus 4.8%; $p = 0.578$).

Conclusion: In this registry, we provide a description of ACS patient, which allows the evaluation of the demographic characteristics, medical treatment prescribed, and in-hospital mortality. A greater awareness of our reality may help the medical community to adhere more strictly to the procedures set by guidelines.

Key words: Acute coronary syndrome, registry, chest pain, unstable angina, acute myocardial infarction.

Acute coronary syndrome (ACS) comprises a group of entities including acute ST-segment elevation myocardial infarction (STEMI), non-ST segment elevation myocardial infarction (non-STEMI), and unstable angina. These manifestations are common causes of medical consultations and admissions at emergency departments, as well as morbidity and mortality worldwide[1-4]. USA epidemiological data show that more than 12 million people suffer from coronary artery disease and more than one million suffer myocardial infarction each year, accounting for approximately 466,000 deaths per year due to coronary artery disease[1,5].

Over the past decade, a greater in-depth understanding of ACS pathophysiology has led to advances in therapeutic interventions and launching of new drugs for treating it[1,6]. National[7] and international[8] guidelines with recommendations for treatment have been developed based on randomized clinical trials conducted with geographically restricted populations and patients who strictly met the criteria for inclusion[1,3].

The registry of ACS patients at our department was created to document baseline clinical characteristics, ACS modes of presentation, medical treatment during in-hospital stay, and clinical progress. This population includes STEMI, non-STEMI and unstable angina patients. A small number of patients admitted due to ACS, but diagnosed as non-cardiac chest pain cases at discharge, were also included in the registry.

The objective of this article is to describe clinical characteristics of the patient population, and identify medical treatment and in-hospital mortality by means of this registry.

Methods

Despite being a tertiary cardiology center, our institution has an emergency department that treats patients with varied clinical conditions. From January 1 to December 31, 2003, 36,600 patients were seen at the Emergency Room (average 3,050 per month), accounting for 6.2% of all hospital admissions (2,287 patients). Of the total number of patients hospitalized, 860 (37.6%) were admitted with the diagnosis of ACS and registered in our database. One hundred and four patients (10.8%) had been readmitted at least once during the same year. Figure 1 shows the flowchart for patients with chest pain treated in the Emergency Room.

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Admission diagnosis of ACS was defined by the presence of resting precordial or retrosternal chest pain for 48 hours suggestive of coronary artery failure, or one or more of the following symptoms: a) ill-defined chest pain considered of ACS origin by the physician who first saw the patient and who decided that hospitalization was necessary; b) dyspnea (including acute pulmonary edema) or syncope of possible ischemic etiology. These findings may or may not be associated with an elevation of the myocardial lesion markers available for evaluation (CPK, CKMB activity, CKMB-mass or cardiac troponin-I), or ischemic alterations considered recent or that were recently revealed on admission electrocardiograms images, such as ST segment depression, persistent ST-segment elevation, T-wave inversion equal to or greater than 0.5 mm, or bundle branch blocks.

A case report form [CRF] with the variables to be included in the database was used to register baseline clinical characteristics, symptoms at presentation, electrocardiographic alterations, laboratory tests, and in-hospital clinical progress.

Statistical evaluation - After being admitted to the emergency room, all patients with clinical suspicion of ACS were prospectively identified. The statistical analysis focused on each modality of ACS. Chi-square and Fisher's exact tests were applied in order to compare proportions among categorical variables, and the Student *t* test was used for the continuous variables.

Results

Table 1 displays baseline clinical characteristics of the population studied. Most subjects were male (58.3%), with 481 (56%) patients in the 55 to 74-year-old age group (average age of 62.6 years ± 11.9). Four hundred and nine patients (47.6%) had a history of ACS, 348 (40.5%) had experienced a previous myocardial infarction, and 94 (10.9%) had unstable angina. Three hundred and forty-three patients (39.9%) had coronary heart disease (defined as coronary obstruction equal to or greater than 50%), while 347 (40.3%) had undergone previous myocardial revascularization (angioplasty or surgery). Precordial pain typical of coronary heart disease affected 742 patients (86.3%).

Diagnosis - Diagnosis at discharge was acute STEMI in 78 patients (9.1%), non-STEMI in 238 (27.7%), unstable angina in 516 (60%), and non-cardiac chest pain in 26 patients (3%). Two patients did not have chest pain (one had syncope and the other, dyspnea), but were considered non-STEMI ACS patients.

Of the 78 STEMI patients, 41 (52.6%) had experienced an anterior wall infarction, 35 (44.9%) an inferior wall infarction, and 4 patients (5.1%), an acute right ventricular infarction.

Of the 516 patients with unstable angina, the great majority had class III B angina (489 patients – 94.8%) followed by III C class (14 patients – 2.7%) and III A class angina (4 patients – 0.8%) as per Braunwald's classification[9].

Risk factors – Systemic arterial hypertension in 672 patients (78.1%) and dyslipidemy in 457 patients (53.1%) were the most frequent risk factors for coronary artery disease, followed by family history of coronary insufficiency, diabetes mellitus and smoking (Tab. 1). Three hundred and forty-seven patients (40.7%) had three or more risk factors.

Risk stratification - Patients diagnosed with non-ST-elevation ACS at admission were stratified by their risk of suffering cardiac events, according to the TIMI Risk Score[10]. One hundred and sixty-three (20.8%) subjects were classified as being at low risk, 446 (57%) at intermediate risk, and 173 (22.1%) at high risk.

Medications used during the hospital stay - Generally speaking, patients were treated intensively with beta-blockers (87.9%), acetylsalicylic acid (95.9%), intravenous nitroglycerin (86.2%), and anti-thrombin drugs (89.9%) (Tab. 2). The oral administration of beta-blockers and acetylsalicylic acid was similar for all modalities of ACS (Tab. 3).

In the Emergency Room, the protocol for administrating an intravenous beta-blocker at admission is restricted to STEMI or non-STEMI ACS patients who initially present with precordial pain associated with a hypertension peak or tachycardia, provided there are no contraindications. In the population studied, this medication was administered intravenously to 52 patients (6%), being prescribed significantly more often for STEMI patients ($p < 0.0001$).

The use of other anti-plaque medications, such as clopidogrel (309 patients – 35.9%) and glycoprotein IIb/IIIa receptor inhibitor (55 patients – 6.4%) was proportionally greater for those patients with STEMI in comparison with non-ST-elevation ACS patients ($p < 0.0001$) (Tab. 3). On the other hand, anti-thrombin drugs were prescribed more frequently for those patients with non-STEMI ACS ($p < 0.0001$).

Coronary arteriography – For patients diagnosed with non-ST-elevation ACS at admission, the use of coronary arteriography is based mainly on the risk stratification according to the TIMI risk score. Nevertheless, it is very important to do an individualized assessment of independent variables of cardiac event risks, such as symptom characteristics, electrocardiographic alterations, and myocardial injury markers. In this population, according to the TIMI risk score, coronary arteriography was performed in 55.2% of the low-risk patients, 57.6% of the intermediate-risk patients, and 61.8% of high-risk patients ($p = 0.450$).

In the total population, coronary arteriography was performed in 526 patients (61.2%), with an average interval of 69.5 hours (± 55.5) between admission and the procedure. Indications for coronary arteriography were considerably higher for STEMI patients (72 of 78 patients – 92.3%) than for non-ST-elevation ACS patients (452 of 756 – 59.8%) ($p < 0.0001$). Two of the 26 patients (7.7%) with a diagnosis of non-cardiac chest pain at discharge underwent coronary arteriography.

The procedure was performed during the first 48 hours after admission in 266 patients (30.9%).

Myocardial revascularization – Of the total population, 340 patients (39.5%) were referred for myocardial revascularization (angioplasty or surgery). Table 4 displays the treatment prescribed according to the modality of ACS. The great majority of STEMI patients underwent primary percutaneous coronary intervention.

Analyzing only those patients who underwent coronary arteriography, clinical treatment was prescribed for 220 patients

Age in years	n (%)
• < 45	65 (7.6)
• 45 < 55	162 (18.8)
• 55 < 65	250 (29.1)
• 65 < 75	231 (26.9)
• 75 < 85	127 (14.8)
• ≥ 85	25 (2.9)
Male (%)	503 (58.3)
Diabetes mellitus (%)	272 (31.6)
Systemic arterial hypertension (%)	672 (78.1)
Dyslipidemy (%)	457 (53.1)
Cigarette smoking (%)	228 (26..)
Family history of CI (%)	337 (35)
Previous acute coronary syndrome (%)	409 (47.6)
• Unstable angina (%)	94 (10.9)
• Acute myocardial infarction (%)	348 (40.5)
Previous cerebrovascular accident (%)	43 (5)
Peripheral artery disease (%)	16 (1.9)
Known coronary artery disease ≥ 50% (%)	343 (39.9)
Previous myocardial revascularization (%)	347 (40.3)
• Percutaneous coronary intervention (%)	205 (23.8)
• Myocardial revascularization surgery (%)	203 (23.6)
Presenting with typical CAD pain (%)	742 (86.3)
Diagnosis at hospital discharge	
• STEMI (%)	78 (9.1)
• Non-STEMI (%)	238 (27.7)
• Unstable angina (%)	516 (60)
• Atypical manifestation* (%)	2 (0.2)
• Non-cardiac chest pain (%)	26 (3)

*CI - coronary insufficiency; CAD - coronary artery disease; STEMI – acute ST-elevation myocardial infarction; Non-STEMI – non-ST-elevation myocardial infarction * One patient with syncope and another with dyspnea.*

Table 1 - Baseline clinical characteristics of 860 consecutive hospital admissions for ACS from January 1 to December 31, 2003

PO beta-blocker (%)	756 (87.9)
IV beta-blocker (%)	52 (6)
Acetylsalicylic acid (%)	825 (95.9)
Calcium-blocker (%)	135 (15.7)
Thienopyridine derivatives (%)	421 (49)
• Clopidogrel (%)	309 (35.9)
• Ticlopidine (%)	187 (21.7)
Anti-thrombin agents (%)	773 (89.9)
• Unfractionated heparin (%)	442 (51.4)
• LMWH (%)	379 (44.1)
IV nitroglycerin (%)	741 (86.2)
PO nitrate (%)	542 (63)
GPI IIb/IIIa (%)	55 (6.4)
• Tirofiban (%)	40 (4.7)
• Abciximab (%)	15 (1.7)
ACEi (%)	670 (77.9)
Statins (%)	610 (70.9)

PO - *Oral administration;* IV - *Intravenous;* LMWH - *low-molecular-weight heparin;* GPI - *glycoprotein IIb/IIIa receptor inhibitor;* ACEi - *angiotensin-converting enzyme inhibitor.*

Table 2 - Medications administered to the overall patient population during hospitalization

(41.8%), percutaneous coronary intervention for 215 (40.9%), and myocardial revascularization surgery for 91 (17.3%). Myocardial revascularization (angioplasty or surgery) was performed during the hospitalization in 255 patients (39.5%).

Mortality or hospital discharge - Of the 860 patients admitted due to ACS, 815 (94.8%) were released from the hospital after 6 days (±8), on average.

Overall hospital mortality was 4.8% (41 patients). There was no significant difference between the proportion of deaths of STEMI and non-ST-elevation ACS patients (6.4% versus 4.8%, respectively; p = 0.578). There were no deaths among patients with non-cardiac chest pain.

Discussion

In real-life, there are substantial differences between ACS patient populations and clinical trial patient populations, with significant heterogeneity in studies conducted in clinical practice[11,12].

Registry data are extremely important because of the information on patients who are frequently left out of clinical trials, such as the elderly or female patients[12]. Additionally, the registries allow an assessment of the acceptance and practice of new treatments by the medical community that tends to resist change despite supportive evidence and guideline recommendations for new types of therapy[12,13].

With this registry, we provide a full description of our population of ACS patients; the large number of patients admitted to a center for cardiac emergencies due to ACS (approximately 40% of the hospitalizations per year) may be the most important observation. As these were not patients selected for specific studies, the study corresponds to the 2003 census of this patient population. Therefore, we are able to present the profile of this population and how treatment has been given after clinical trials and recommended guidelines became easily accessible to the medical community.

Approximately half of the GRACE registry patients were over 65 years of age, and more than one third were women[12]. Similarly, of the ACS patients admitted to the emergency room at our institution, 49.6% were 65 years of age or more and 41.5% were women (male: female ratio of 1:4).

Among the modalities of ACS, investigators of the ENACT[3] study reported that unstable angina was the most frequent cause of hospital admission (46%), followed by AMI (39%). Data from the GRACE study[1] published in 2002 presented the results of 11,543 patients showing that at discharge 38%

Medications	STEMI	Non-STEMI	Unstable angina	Non-cardiac chest pain	* p
IV beta-blocker (%)	20 (25.6)	13 (5.5)	19 (3.7)	0	<0.0001
PO beta-blocker (%)	68 (87.2)	209 (87.8)	460 (89.1)	18 (69.2)	0.683
Calcium blocker (%)	7 (9)	40 (16.8)	85 (16.5)	3 (11.5)	0.08
Acetylsalicylic acid (%)	73 (93.6)	229 (96.2)	496 (96.1)	25 (96.2)	0.239
Thienopyridine derivatives (%)	71 (81.6)	135 (53.6)	260 (43.7)	6 (22.2)	<0.0001
• Clopidogrel (%)	43 (55.1)	98 (41.2)	162 (31.4)	6 (23.1)	<0.0001
• Ticlopidine (%)	41 (52.6)	56 (23.5)	90 (17.4)	0	<0.0001
Anti-thrombin agents (%)	53 (60.9)	234 (92.9)	557 (93.6)	22 (81.5)	<0.0001
• Unfractionated heparin (%)	32 (41.0)	133 (55.9)	262 (50.8)	14 (53.8)	0.056
• LMWH (%)	19 (24.4)	107 (45)	244 (47.3)	8 (30.8)	<0.0001
IV nitroglycerin (%)	55 (70.5)	212 (89.1)	454 (88.1)	19 (73.1)	<0.0001
PO nitrate (%)	47 (60.3)	158 (66.4)	325 (63.1)	11 (42.3)	0.506
GPI IIb/IIIa (%)	13 (16.7)	22 (9.2)	20 (3.9)	0	<0.0001
• Tirofiban (%)	1 (1.3)	22 (9.2)	17 (3.3)	0	0.166
• Abciximab (%)	12 (15.4)	0	3 (0.6)	0	<0.0001
ACEi (%)	66 (84.6)	188 (79)	400 (77.5)	15 (57.7)	0.174
Statins (%)	59 (75.6)	172 (72.3)	362 (70.2)	16 (61.5)	0.371

ACS - *acute coronary syndrome;* STEMI – *acute ST-elevation myocardial infarction;* Non-STEMI – *non-ST-elevation myocardial infarction;* IV - *intravenous;* PO - *oral administration;* LMWH - *low-molecular-weight heparin;* GPI - *glycoprotein IIb/IIIa receptor inhibitor;* ACEi - *angiotensin-converting enzyme inhibitor; *p refers to the statistical significance between STEMI and non-ST-elevation* ACS *patients* (non-STEMI + *unstable angina).*

Table 3 - Medications utilized during hospitalization according to the modality of ACS at presentation

Treatment indicated	STEMI N= 78	Non-STEMI N= 238	UA N= 516
Clinical (%)	18 (23.1)	129 (54.2)	346 (67.1)
PCI (%)	51 (65.4)	61 (25.6)	117 (22.7)
Surgery (%)	9 (11.5)	48 (20.2)	53 (10.3)

ACS - *acute coronary syndrome;* STEMI – *acute ST-elevation myocardial infarction;* Non-STEMI – *non-ST-elevation myocardial infarction;* PCI - *percutaneous coronary intervention;* UA - *unstable angina; One patient discharged with non-cardiac chest pain was submitted to myocardial revascularization surgery.*

Table 4 - Treatment indicated according to the modality of ACS

of them had a diagnosis of unstable angina, 30% of STEMI, and 25% non-STEMI.

In this study, of the 860 patients admitted due to ACS, the most frequent diagnosis at discharge was unstable angina (60%), followed by non-STEMI (27.7%), and STEMI (9.1%). Most STEMI patients had experienced an AMI of the anterior wall (52.6%).

The frequent use of pharmacologic therapies, such as oral acetylsalicylic acid (95.9%) and beta-blockers (87.9%), compares to previous reports issued by institutions with coronary arteriography facilities[1]. Use of acetylsalicylic acid for all modalities of ACS is consistent with guidelines that recommend its use for patients with AMI and unstable angina. The use of beta-blockers was also consistent with current recommendations, particularly for patients with unstable angina[7,8,14,15].

A large number of patients were also given intravenous nitrate (86.2%) and anti-thrombin agents (89.9%), the latter prescribed primarily for patients with non-ST-elevation ACS. Some drugs with proven benefits were used less often, such as clopidogrel (35.9%) and glycoprotein IIb/IIIa receptor inhibitors (6.4%). The use of glycoprotein IIb/IIIa receptor inhibitors was slightly higher than at institutions that do not perform coronary arteriography[1], which possibly reflects a concern with possible hemorrhagic complications with this class of drugs. Its use was proportionally greater in STEMI patients (16.7% versus 5.6%; $p > 0.0001$).

As our institution is a tertiary hospital with an interventional cardiology unit, use of the percutaneous coronary procedure was considerably higher for STEMI patients, and a proportionally higher number of subjects from this population underwent coronary arteriography as compared to non-ST-elevation ACS patients (92.3% *versus* 59.8%; $p < 0.0001$). Previous reports have shown that coronary arteriography is a procedure routinely performed in STEMI and non-STEMI patients; the difference in frequency depends on the characteristics of the hospital (whether a teaching hospital or a tertiary cardiology care center)[16]. The proportion of patients who undergo coronary arteriography and myocardial revascularization procedures is significantly higher at institutions with easy access to a catheterism unit[16].

Percutaneous coronary intervention was indicated in 65.4% of STEMI patients and 25.6% of non-STEMI patients. These percentages are considerably higher than those reported in the ENACT study (8%)[3]. Myocardial revascularization surgery was performed in a small number

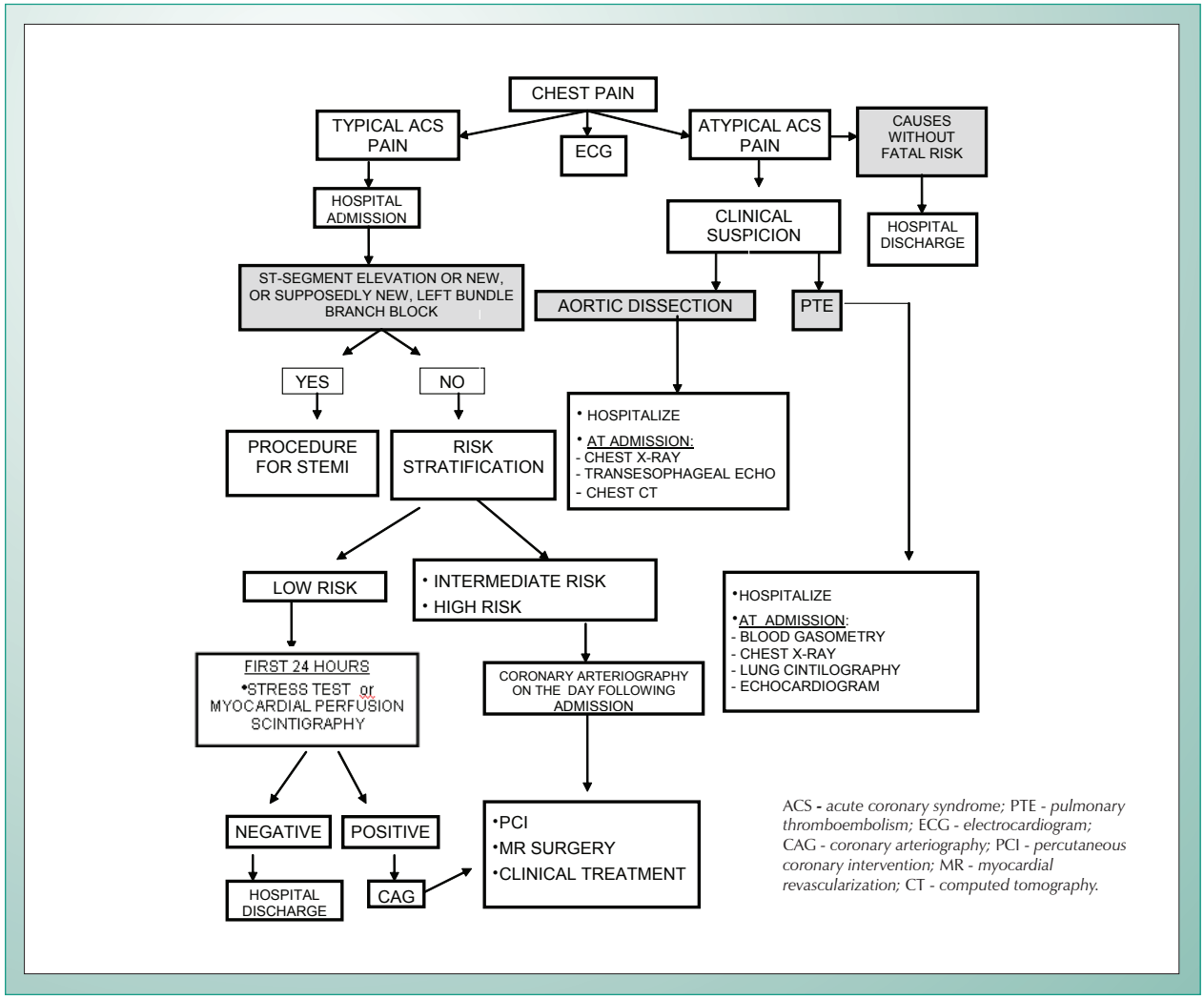

Fig. 1 - *Chest pain flowchart.*

of subjects and, similar to the GRACE registry reports[1], was indicated mainly for non-STEMI patients.

In-hospital mortality of STEMI patients was comparable to data reported in previous registries (6.4%), and was smaller than that reported in the NRMI 3 study (9%)[17]. Likewise, in-hospital mortality of non-ST elevation ACS patients (4.8%) was equivalent to that of the OASIS registry of non-STEMI and unstable angina patients in seven days (5%)[18].

Therefore, this registry gives a more realistic picture of our ACS patient population profile and the procedures currently performed at a cardiac emergency center in Brazil. Awareness of our reality may help the medical community adhere more strictly to the procedures set by national and international guidelines.

Limitations of the study – as is true for any observational study, data of this registry are limited since information is drawn from a database.

There is no report on the progression of the disease, success rates according to the myocardial revascularization procedures performed, or outcomes of intercurrent conditions and complications.

Potential Conflict of Interest

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

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