Acute Coronary Syndrome Behavior: Results of a Brazilian Registry

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Abstract

Background: **Brazil lacks published multicenter registries of acute coronary syndrome.**

Objective: **The Brazilian Registry of Acute Coronary Syndrome is a multicenter national study aiming at providing data on clinical aspects, management and hospital outcomes of acute coronary syndrome in our country.**

Methods: **A total of 23 hospitals from 14 cities, participated in this study. Eligible patients were those who came to the emergency wards with suspected acute coronary syndrome within the first 24 hours of symptom onset, associated with compatible electrocardiographic alterations and/or altered necrosis biomarkers. Follow-up lasted until hospital discharge or death, whichever occurred first.**

Results: **Between 2003 and 2008, 2,693 ACS patients were enrolled, of which 864 (32.1%) were females. T he final diagnosis was unstable angina in 1,141 patients, (42.4%), with a mortality rate of 3.06%, non-ST elevation acute myocardial infarction (AMI) in 529 (19.6%), with mortality of 6.8%, ST-elevation AMI 950 (35.3%), with mortality of 8.1% and non-confirmed diagnosis 73 (2.7%), with mortality of 1.36%. The overall mortality was 5.53%. The multiple logistic regression model identified the following as risk factors for death regarding demographic factors and interventions: female gender (OR=1.45), diabetes mellitus (OR=1.59), body mass index (OR=1.27) and percutaneous coronary intervention (OR=0.70). A second model for death due to major complications identified: cardiogenic shock/acute pulmonary edema (OR=4.57), reinfarction (OR=3.48), stroke (OR=21.56), major bleeding (OR=3.33), cardiopulmonary arrest (OR=40.27) and Killip functional class (OR=3.37).**

Conclusion: **The Brazilian Registry of Acute Coronary Syndrome data do not differ from other data collected abroad. The understanding of their findings may help promote better planning and management of acute coronary syndrome care in public and private health services (Arq Bras Cardiol. 2013;100(6):502-510).**

Keywords: **Acute Coronary Syndrome; Multicenter Studies as Topic; Diseases Registries; Clinical Evolution.**

Introduction

In the year 2010, circulatory system diseases, the third leading cause of hospitalization, with 210,046 hospitalizations due to ischemic heart disease were responsible, in Brazil, for 29% of deaths, of a total of 1,133,761. The absolute number of deaths from ischemic heart disease in that year was 99,408 deaths or 52.11 deaths/100,000 inhabitants, whereas deaths from cerebrovascular diseases was 99,159 or 51.98 deaths/100,000 inhabitants[1]. The prevalence of Coronary Artery Disease (CAD) in the adult population is estimated at 5-8%[2].

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Manuscript received April 09, 2012, revised manuscript September September 24, 2012, accepted November 19, 2012.

DOI: 10.5935/abc.20130101

In 2010, there were 79,954 deaths associated with acute coronary syndrome (ACS). These figures account for the total number of deaths from angina and acute myocardial infarction (AMI), corresponding to 7.05% of total deaths in the year, or 24.67% of deaths from circulatory system diseases[1].

The ACS is also an important cause of hospitalization, with AMI being the third leading cause of hospitalization under the Brazilian Unified Health System (SUS) in 2009. It represented 10.2% of hospital admissions, a number that exceeds 25% of the population older than 50 years.

The main source of health coverage in the country is provided by SUS, whereas private health insurance accounted for 25.9% (95% confidence interval - 95% CI = 25.4 to 26.4) of the population in 2008. ACS was responsible for the highest costs with hospital admissions, corresponding to a total of R$ 1.9 billion or 19% of total cost with hospitalizations[3].

Regarding the health coverage provided by SUS, in 2011, the estimated direct cost of the ACS was R $ 522,286,726.00, corresponding to 0.77% of the total budget, whereas the Private Health System cost was R$ 515,138,617.00, with indirect costs of $ 2.8 billion and the total cost estimated at R$ 3.8 billion[4].

The knowledge of hospital behavior of patients with ACS is essential for immediate in-hospital risk stratification and in the long term, for the acute episode survivors, as well as to show how these patients are managed in our country.

Several international ACS registries have been published, including some with the participation of Brazilians centers[5-8]. National registries are scarce and included patients from a single center, not representative of the national reality[9]. The Brazilian Registry of Acute Coronary Syndromes (RBSCA), partially presented in national[10] and international[11] congresses, aims to fill this gap, providing this information to interested professionals. It aims to disclose the results of a large national multicenter registry, representative of the characteristics, management and hospital evolution of ACS in the country.

Methods

Study design

RBSCA is a prospective, national, multicenter, non-funded study, designed to assess in-hospital data from patients with suspected ACS, admitted to the emergency department of hospitals invited to participate in the study, in different parts of Brazil, aiming to reflect the behavior of ACS in hospitals with the characteristics described below. The invited hospitals should have prior experience in clinical trials, as well as the main investigators, who should be experienced in research activities.

Hospitals, investigators and population

A total of 23 hospitals located in 14 cities participated in the RBSCA, of which four were private, 15 were philanthropic and four were public. Of these, six did not provide health care services through SUS. All had coronary care units or emergency rooms with electrocardiographic monitoring, hemodynamic laboratory and were able to carry out percutaneous coronary intervention and cardiac surgery procedures (Appendix 1).

The principal investigators were Board Certified[20] by the Brazilian Cardiology Society (SBC) and / or had an academic degree[14].

The target population consisted of patients admitted to the emergency department or coronary care unit with a diagnosis of ACS.

Eligibility

Eligible patients were those who presented to the emergency room with suspected ACS, with a suggestive clinical picture, associated with compatible ECG alterations and/or altered necrosis markers. We included only patients with up to 24 hours of symptom onset. Follow-up was performed until hospital discharge or death, whichever occurred first.

Inclusion Criteria

For AMI with ST-segment elevation (STEMI):

• conclusive electrocardiogram (ECG) alterations indicating STEMI: Persistent elevation of ST (≥ 0.2 mV in two contiguous precordial leads, or ≥ 0.1 mV in at least two limb leads) or new left bundle branch block, or ECG alterations indicating true posterior AMI;

• increase in biochemical markers of necrosis;

For AMI with no ST elevation (NSTEMI):

• alterations in ECG features compatible with ischemia (e.g., ST depression ≥ 1 mm in at least two adjacent leads or T-wave inversion > 3 mm or any dynamic alteration in ST segment or transient ST elevation);

• increase in biochemical markers of necrosis.

Unstable angina (UA):

• characteristic ECG alterations compatible with ischemia (e.g., ST depression 1 mm in at least two adjacent leads or T-wave inversion > 3 mm or any dynamic alteration in ST segment or transient ST elevation).;

• no increase in biochemical markers of necrosis

All

• signed informed consent form;

• onset of symptoms suggestive of ACS ≤ 24 hours.

Exclusion criteria

• The exclusion criteria included:

• age < 18 years;

hospital admission with symptoms suggesting ACS, but not confirmed by clinical history, physical examination and laboratory tests (biochemical markers of necrosis).

Data collection

Data were collected and sent in electronic form through the internet to the Coordinating Center, located at Instituto Dante Pazzanese de Cardiologia. This form, containing 182 questions, included identification, personal history, demographics, diagnosis, hospital evolution, complications, drug treatment, interventions and hospital discharge status. When there were discrepancies in relation to the received data, the Research Center was contacted.

The study protocol was approved by the Ethics Committees of the participating hospitals, and enrolled patients signed the free and informed consent form, according to Resolution #196 of the National Health Council, of October 10, 1996.

Statistical Analysis

Factors (qualitative measures) and covariates (quantitative measures) were compared in the presence or absence of death. Qualitative measures were summarized in descriptive statistics of absolute (n) and relative (n) frequencies, in the categories of the groups with the absence and presence of death. The association alone (univariate) between these measures and death was evaluated by Pearson's Chi-square test or Fisher's exact test[12]. Quantitative measures (continuous variables) were expressed as median and interquartile range (IQR) = (25^{th} percentile-75^{th} percentile).

The nonparametric Mann-Whitney test was used for the comparison alone (univariate) of these measures between groups[13]. To better understand the predictors of risk of death, two analyses of multiple logistic regression models were performed[14]: one to identify demographic factors and associated in-hospital interventions, and another to identify the influence of major complications on death. Effects or differences were considered statistically significant when p values < 0.05 were found. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS), release 19.

Results

Between 2003 and 2008, 2693 patients diagnosed with ACS were included in the study, of which 864 (32.1%) were women. The median age was 63 years. The final diagnosis was UA in 1141 (42.4%) patients, NSTEMI in 529 (19.6%), STEMI in 950 (35.3%) and unconfirmed diagnosis in 73 (2.7%).

Comparison of baseline characteristics between survivors and deaths during hospitalization is shown in Table 1. The significant differences of the variables in survivors, when compared to the ones who died were median age (62 *versus* 71 years), female gender (31.6 *versus* 41.6%), family history of CAD (29.5% *versus* 44.5% versus 29.5%), cerebrovascular accident (4.9 *versus* 10.1%), CHF (7.2 *versus* 18.8%), diabetes mellitus (27.2 *versus* 38.3%), prior percutaneous coronary intervention (PCI) (18.2 *versus* 11.4%), heart rate (75 *versus* 82 bpm), systolic blood pressure (130 *versus* 120 mmHg), diastolic blood pressure (80 *versus* 70 mmHg), body mass index (26.1 *versus* 25.4), creatine kinase MB fraction of cardiac muscle - CKMB (70.4 *versus* 12) and ejection fraction (50 *versus* 55).

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In Table 2, which assesses drug use, it can be observed that higher mortality was related to the intravenous use of beta-blockers (8.2 *versus* 16.8%), nitrates (66.4 *versus* 80.5%), Low Molecular Weight Heparin (LMWH) (55.0 versus 69.8%), tirofiban (10.4 *versus* 36.9%), amiodarone (6.8 *versus* 28.9%), lidocaine (2.3 *versus* 6.7%) and diuretics (27.2 *versus* 52.3%). There was a decrease in mortality associated with the use of oral beta-blockers (79.1 *versus* 38.9%), calcium channel blockers (10.1 *versus* 4.7%), unfractionated heparin (UFH) (31.3 *versus* 23.5%), clopidogrel (63.7 *versus* 49.7%); Angiotensin-Converting Enzyme Inhibitors (ACEI) (67.3 *versus* 56.4%), ACEI and/or Angiotensin-receptor blockers (ARBs) (70.5 *versus* 57.7%) and statins (78.8 *versus* 48.3%); in addition to the aspirin, oral beta-blockers and statin (63.2 *versus* 22.1%) and aspirin, oral beta-blockers, statins and ACEI associations (45.4 *versus* 16.1%).

Table 3 analyzes complications/procedures associated with death: cardiogenic shock/pulmonary edema (3.5 *versus* 75.8%), heart failure (7.75 *versus* 59.1%), Killip class II (10.8 *versus* 14.0%) , Killip class III (2.8 *versus* 15.1%), Killip class IV (1.7 *versus* 65.5%), moderate (22.0 *versus* 31.7%) and severe (8.9 *versus* 26.8%) left ventricular function, AMI/new AMI (1.4 *versus* 11.4%), recurrent angina (6.1 *versus* 14.1%), arrhythmia requiring treatment (6.0 *versus* 53.7%), cerebrovascular accident (CVA) (0.5 *versus* 4.0%), major bleeding (4.0 *versus* 22.8%), cardiac arrest (1.0 *versus* 62.4%), mechanical complications (0.4 *versus* 3.4%), CABG (10.9 *versus* 22.1%), pacemaker (1.4 *versus* 14.1%) and intra-aortic balloon (0.6 *versus* 7.4%). Coronary angiography (85.1 *versus* 75.0%), normal (38.9 *versus* 12.2%) and mild (30.2 *versus* 29.3%) left ventricular function and percutaneous coronary intervention (53.6 *versus* 36.8%) were associated with survival.

The most frequent final diagnosis was UA, followed by STEMI and NSTEMI, as shown in Table 4.

The multiple logistic regression model of demographic factors and in-hospital interventions associated with death, shown in Table 5, disclosed an increased risk of female gender (OR = 1.45, 95% CI: 1.16 to 1.81), diabetes mellitus (OR = 1.59, 95% CI: 1.27 to 1.98) and BMI (OR = 1.27, 95% CI: 1.23 to 1.30) and protective factor of the coronary intervention (OR = 0.70 95%CI: 0.57 to 0.86). Table 6 shows the estimates of the mortality risk of major in-hospital complications: cardiogenic shock/APE, myocardial reinfarction, CVA, severe bleeding, cardiorespiratory arrest and Killip functional class.

Discussion

Clinical records are an excellent opportunity to evaluate the clinical presentation, behavior, treatment and outcome of a disease and the patients affected by it. Randomized clinical trials, while also providing clinical information, follow specific inclusion criteria, thus limiting the sample. In registries, patients are not selected and their findings more properly reflect the so-called "real world", in which cardiologists work and live their daily routine.

Regarding this approach of the RBSCA database, we sought to analyze the entire spectrum of ACS, without differentiating the three clinical pictures (UA, NSTEMI and STEMI). A total of 2693 patients were included and we sought to establish the importance of the main variables analyzed and correlate them with the complications and deaths observed during hospitalization.

Similar to other contemporary ACS registries, the present one also showed that UA was the most frequent diagnosis (42%), with a mortality of 3.06%, followed by STEMI (35%), with a mortality of 8.10%, NSTEMI (20%), with a mortality of 6.80%, and undefined diagnosis, 2.7%, with 1.36% mortality. The overall mortality in ACS was 5.53%.

A recent registry of a national specialized hospital identified in-hospital mortality for UA/NSTEMI of 4.8% and mortality for STEMI of 6.4%, with no significant difference between these diagnoses[9]. In another single-center national registry, which included 411 patients, in-hospital mortality was 4.1% for unstable angina, 12.5% for AMI and total mortality of 9.0%[15].

The Brazilian Registry on Acute Coronary Syndromes (BRACE) analyzed regional differences on the use of drugs and reperfusion therapies (fibrinolytics and primary angioplasty) in 1,150 patients[16].

The Brazilian Registry of Clinical Practice in Acute Coronary Syndrome of the Brazilian Society of Cardiology (ACCEPT-SBC) is a prospective, observational registry that aims to document the in-hospital clinical practice of ACS

Table 1 - Basal characteristics (I)

		Living patients (n = 2,544)	Deaths (n = 149)	Total (n = 2,693)	p value
Age	Mean	62.4 (12.5%)	71.4 (12.0%)	62.9 (12.7%)	< 0.001
	Median	62	71	63	
	Min-max	20 - 105	40 - 104	20 - 105	
Female		802 (31.6%)	62 (41.6%)	864 (32.1%)	0.011
Obesity		726 (28.5%)	34 (22.8%)	760 (28.2%)	0.132
Smoker	Ex	889 (35.5%)	70 (47.6%)	959 (36.2%)	0,005
	Current	676 (27.0%)	26 (17.7%)	702 (26.5%)	
Dyslipidemia		1,166 (45.8%)	65 (43.6%)	1.231 (45.7%)	0.599
Previous AMI		659 (25.9%)	31 (20.8%)	690 (25.6%)	0.166
Angina		1,224 (48.1%)	77 (51.7%)	1.301 (48.3%)	0.397
Arterial hypertension		1,770 (69.6%)	111 (74.5%)	1.881 (69.8%)	0.203
Family history of CAD		1,132 (44.5%)	44 (29.5%)	1.176 (43.7%)	< 0.001
CVA		125 (4.9%)	15 (10.1%)	140 (5.2%)	0.006
Heart failure		184 (7.2%)	28 (18.8%)	212 (7.9%)	< 0.001
Chronic kidney disease		156 (6.1%)	15 (10.1%)	171 (6.3%)	0.056
Diabetes mellitus		691 (27.2%)	57 (38.3%)	748 (27.8%)	0.003
PCI		463 (18.2%)	17 (11.4%)	480 (17.8%)	0.035
CABG		315 (12.4%)	12 (8.1%)	327 (12.1%)	0.116
Drug treatment		1.110 (43.6%)	65 (43.6%)	1.175 (43.6%)	0.998
HR	Median	75	82	75	< 0.0001
	IQR	65 - 84	66.5 - 100	65 - 85	
SBP	Median	130	120	130	< 0.001
	IQR	120 - 150	100 - 140	120 - 150	
DBP	Median	80	70	80 < 0.001	< 0.001
	IQR	70 - 90	60 - 90	70 - 90	
BMI	Median	26.13	25.4	26.12	0.026
	IQR	23.9 - 29	23.4 - 27.55	23.9 - 28.9	
Troponina I	Median	1.23	1.0	1.2	0.204
	IQR	0.37 - 8.12	0.45 - 2	0.37 - 6.63	
CKMB	Median	12	70.4	12.9	< 0.001
	IIQ	5 - 59	15 - 145.5	5 - 62	
EF	Median	75	87.5	78	0.212
	IIQ	40 - 120	51.5 - 161.25	40 - 120	

AMI: acute myocardial infarction, CAD: coronary artery disease, CVA: cerebrovascular accident, PCI: percutaneous coronary intervention, CABG: coronary artery bypass surgery, HR: heart rate, IQR: interquartile range, SBP: systolic blood pressure, DBP: diastolic blood pressure, BMI: body mass index; CKMB: creatine kinase MB fraction of cardiac muscle, EF: ejection fraction.

carried in public and private hospitals in Brazil. It included 24 hospitals and 2,475 patients with a confirmed diagnosis of ACS[17,18]. Table 7 compares the main differences found in relation to the Brazilian Registry of Clinical Practice in Acute Coronary Syndromes of the Brazilian Society of Cardiology (ACCEPT-SBC) and RBSCA.

Although a statistical comparison is not possible because data from the BRACE and ACCEPT-SBC are not available on an individual basis, the available numerical comparisons show no large discrepancies (Table 7). Only mortalities in ACCEPT-SBC and RBSCA are different (2.75 and 5.53%), respectively, probably due to the characteristics of hospitals and patients,

Table 2 - In-hospital drug therapy

	Living patients (n= 2.544)	Deaths (n = 149)	Total (n = 2.693)	p value
Aspirin	2.405 (94.5%)	140 (94.0%)	2.545 (94.5%)	0.764
IV beta-blockers	209 (8.2%)	25 (16.8%)	234 (8.7%)	< 0.001
Oral beta-blockers	2.013 (79.1%)	58 (38.9%)	2.071 (76.9%)	< 0.001
CCB	258 (10.1%)	7 (4.7%)	265 (9.8%)	0.030
Nitrates	1.688 (66.4%)	120 (80.5%)	1.808 (67.1%)	< 0.001
UFH	795 (31.3%)	35 (23.5%)	830 (30.8%)	0.046
LMWH	1.399 (55.0%)	104 (69.8%)	1.503 (55.8%)	< 0.001
Abciximab	58 (2.3%)	4 (2.7%)	62 (2.3%)	0.775
Tirofiban	264 (10.4%)	55 (36.9%)	319 (11.8%)	< 0.001
Clopidogrel	1.621 (63.7%)	74 (49.7%)	1.695 (62.9%)	0.001
Ticlopidine	281 (11.0%)	9 (6.0%)	290 (10.8%)	0.055
ACEI	1.713 (67.3%)	84 (56.4%)	1.797 (66.7%)	0.006
ARB	119 (4.7%)	6 (4.0%)	125 (4.6%)	0.714
ACEI/ARB	1.793 (70.5%)	86 (57.7%)	1.879 (69.8%)	0.001
Statins	2.004 (78.8%)	72 (48.3%)	2.076 (77.1%)	< 0.001
Amiodarone	174 (6.8%)	43 (28.9%)	217 (8.1%)	< 0.001
Lidocaine	58 (2.3%)	10 (6.7%)	68 (2.5%)	0.004
Diuretics	692 (27.2%)	78 (52.3%)	770 (28.6%)	< 0.001
Aspirin + oral beta-blocker + statin	1.608 (63.20%)	33 (22.10%)	2.545 (60.90%)	< 0.001
Aspirin + oral beta-blocker + statin + ACEI	1.155 (45.40%)	24 (16.10%)	1.179 (43.80%)	< 0.001

IV: intravenous route; CCB: calcium channel blocker; UFH: unfractionated heparin; LMWH: low-molecular weight heparin; ACEI: angiotensin-converting enzyme inhibitor; ARB: angiotensin receptor blocker.

since only 50% of hospitals met the ACCEPT-SBC treated SUS patients, while in RBSCA this figure reached 74%. In ACCEPT-SBC, coronary angiography was performed in 80.6%, PCI in 50.8% and coronary artery bypass graft surgery (CABG) in 6.1% of patients; in RBSCA, these figures were 84.5%, 52.7 % and 11.6%, respectively.

In the Spanish registry Mascara[1 9], which included 7,923 patients, the in-hospital overall mortality was 5.7%, with 3.9% for UA/NSTEMI, 7.6% for STEMI and 8.8% for unclassified ACS. Data from the GRACE registry, of 2002, showed an in-hospital mortality of 3% for UA, 5% for NSTEMI and 7% for STEMI. In the U.S. registry Action[20], which included 22,025 patients with STEMI, the in-hospital mortality rate was 6.0% and in NSTEMI, which included 32,741 patients, mortality was 4.0%. These data showed the findings of RBSCA to be in agreement with those from other registries.

In RBSCA, the risks most often associated with ACS onset and that had prevalence > 40% were arterial hypertension, prior angina, dyslipidemia, family history of CAD and drug treatment for CAD. Other baseline conditions associated with mortality, although less frequent (< 40%) were female gender, smoking (negative), CVA, heart failure, chronic renal failure, diabetes mellitus and percutaneous coronary intervention. Heart rate, systolic and diastolic blood pressure, BMI and diagnosis at discharge were associated with a higher in-hospital mortality.

Complications associated with death were cardiogenic shock/acute pulmonary edema, heart failure, reinfarction, recurrent angina, arrhythmias requiring treatment, CVA, major bleeding, cardiac arrest and mechanical complications. Those who required coronary artery bypass surgery, pacemakers and intra-aortic balloon (possibly more severe cases), also showed higher incidence of death. Percutaneous coronary intervention was shown to be a protective factor.

Of the drugs used in-hospital, the most frequently used were aspirin, beta-blockers, nitrates, clopidogrel, heparins, statins and ACE inhibitors. A total of 60.9% of patients used the aspirin, beta blockers and oral statin association, while 43.8% associated ACE inhibitors to these drugs. Decrease in mortality was associated with the use of oral beta-blockers, calcium channel blockers, UFH, clopidogrel, ACE inhibitors, statins, the association of aspirin, beta-blockers and statins and the association of aspirin, oral beta-blockers, statins and ACE inhibitors. These two associations are standard in the treatment of ACS, and the association with ACE inhibitors is more often used in the presence of left ventricular dysfunction.

Table 3 - In-hospital complications

		Living patients (n = 2.544)	Deaths (n = 149)	Total (n = 2.693)	p value
Cardiogenic shock/pulmonary edema		88 (3.5%)	113 (75.8%)	201 (7.5%)	< 0.001
Heart failure		196 (7.75)	88 (59.1%)	284 (10.5%)	< 0.001
AMI/new AMI		36 (1.4%)	17 (11.4%)	53 (2.0%)	< 0.001
Recurrent angina		155 (6.1%)	21 (14.1%)	176 (6.5%)	< 0.001
Arrhythmias requiring treatment		153 (6.0%)	80 (53.7%)	233 (8.7%)	< 0.001
CVA		13 (0.5%)	6 (4.0%)	19 (0.7%)	< 0.001
Major bleeding		101 (4.0%)	34 (22.8%)	135 (5.0%)	< 0.001
Cardiac arrest		26 (1.0%)	93 (62.4%)	119 (4.4%)	< 0.001
Mechanical complications		9 (0.4%)	5 (3.4%)	14 (0.5%)	0.001
Coronary angiography		2.148 (85.1%)	111 (75%)	2.259 (84.5%)	0.001
LV function	Normal	728 (38.9%)	10 (12.2%)	738 (37.8%)	< 0.001
	Medium	566 (30.2%)	24 (29.3%)	590 (30.2%)	
	Moderate	412 (22.0%)	26 (31.7%)	438 (22.4%)	
	Severe	166 (8.9%)	22 (26.8%)	188 (9.6%)	
PCI		1.279 (53,6%)	49 (36.8%)	1.328 (52.7%)	<0.001
CABG		273 (10,9%)	33 (22.1%)	306 (11.6%)	<0.001
Pacemaker		36 (1,4%)	21 (14.1%)	57 (2.1%)	< 0.001
IAB		15 (0.6%)	11 (7.4%)	26 (1.0%)	< 0.001
Killip	Class I	1.839 (81.0%)	12 (8.6%)	1.851 (76.9%)	< 0.001
	Class II	318 (14.0%)	15 (10.8%)	333 (13.8%)	
	Class III	63 (2.8%)	21 (15.1%)	84 (3.5%)	
	Class IV	39 (1.7%)	91 (65.5%)	130 (5.4%)	

AMI: acute myocardial infarction, CVA: cerebrovascular accident, LV: left ventricle, PCI: percutaneous coronary intervention, CABG: coronary artery bypass surgery; IAB: intraaortic balloon.

Table 4 - Final diagnosis

Diagnosis at discharge	Living patients (n = 2.544)	Deaths (n = 149)	Total (n = 2.693)	p value
Unstable angina	1,106 (43.7%)	35 (23.5%)	1,141 (42.4%)	< 0.001
NSTEMI	493 (19.4%)	36 (24.2%)	529 (19.6%)	
STEMI	873 (34.3%)	77 (51.7%)	950 (35.3%)	
Unconfirmed	72 (2.83%)	1 (0.67%)	73 (2.71%)	

NSTEMI: Non-ST Segment Elevation Myocardial Infarction; STEMI: ST-Segment Elevation Myocardial Infarction.

Table 5 - Results of the logistic model for the demographic variables and hospital interventions associated with death

Overall	Effect	Standard error	OR	95%CI OR		p value
				Lower	Upper	
Female gender	0.370	0.113	1.45	1.16	1.81	0.001
Diabetes mellitus	0.463	0.113	1.59	1.27	1.98	< 0.001
Percutaneous coronary intervention	-0.361	0.106	0.70	0.57	0.86	0.001
Body Mass Index	0.237	0.015	1.27	1.23	1.30	< 0.001
Constant	-7.420	0.413	0.00			

OR: odds ratio; 95%CI: 95% confidence interval.

Table 6 - Logistic model results for major complications associated with death

Complications	Effect	Standard error	OR	95%CI OR		p value
				Lower	Upper	
Cardiogenic shock /APE	1,519	0.350	4.57	2.30	9.06	< 0.001
Myocardial reinfarction	1,248	0.536	3.48	1.22	9.95	0.020
Cerebrovascular accident	3,071	0.764	21.56	4.82	96.47	< 0.001
Severe bleeding	1,202	0.417	3.33	1.47	7.53	0.004
Cardiorespiratory arrest	3,696	0.384	40.27	18.99	85.40	< 0.001
Killip classification	1,214	0.141	3.37	2.56	4.44	< 0.001
Constant	-6,873	0.412	0.00			< 0.001

OR: odds ratio; 95%CI: 95%; confidence interval; APE: acute pulmonary edema.

Table 7 – Main comparative data from multicenter Brazilian acute coronary syndrome registries

		ACCEPT-SBC	BRACE	RBSCA
Total		2,475	1,150	2,693
Mean age (a)		64-65-61	63.6	62.9
Male gender (%)		67.8	63.7	67.9
Antecedents	SAH (%)		69.5	69.8
	DM (%)	30.8	25	27.8
	Family history (%)		48	43.7
	Ex-smoker (%)		28.4	36.2
	Smoker (%)		29.5	26.5
	PCI (%)	23.7	13.6	17.8
	CABG (%)	11.7	10	12.1
	CVA (%)	7.7	5.9	5.2
	CKD (%)		3.2	6.3
In-hospital treatment	Aspirin (%)	92.5	86	94.5
	Clopidogrel (%)	68	50.1	62.9
	Beta-blocker (%)	77.1	69.8	76.9
	ACEI/ARBs (%)		67.2	69.8
	Statins (%)	89.4	78.7	77.1
Diagnosis	Unstable angina (%)	31.7		42.4
	NSTEMI (%)	34.9		19.6
	STEMI (%)	33.4		35.3
Evolution	Death	2.75		5.53
	Reinfarction	3.1		2.0
	CVA	0.65		0.7

ACCEPT-SBC: Brazilian Registry of Clinical Practice in Acute Coronary Syndromes of the Brazilian Society of Cardiology (ACCEPT-SBC); BRACE: Brazilian Registry on Acute Coronary Syndromes; RBSCA: Brazilian Registry of Acute Coronary Syndromes; SAH: systemic arterial hypertension; DM: diabetes mellitus; PCI: percutaneous coronary intervention; CABG: coronary-artery bypass graft; CVA: cerebrovascular accident; CKD: chronic kidney disease; ACEI: angiotensin-converting enzyme inhibitors; ARBs: angiotensin-receptor blockers; NSTEMI: Non-ST Segment Elevation Myocardial Infarction; STEMI: ST-Segment Elevation Myocardial Infarction.

The mortality was significantly higher among those who received intravenous beta-blockers, nitrates, tirofiban, amiodarone, lidocaine, diuretics. In this type of study, it is difficult to characterize medications as being protective or not. The prescription of certain drugs, such as diuretics and antiarrhythmics, is often associated with clinical severity. It has been observed that the therapy prescribed follows the recommendations established by national guidelines[21,22].

Registry Limitations

Although the invited investigators were all experienced in clinical research (Appendix 1) there was no local monitoring or auditing for information verification, due to lack of financial resources. All information collected was reported by participating services. Only missing or discrepant data were verified.

The participating hospitals, concentrated in the South and Southeast regions, are tertiary hospitals equipped for interventional procedures, either percutaneous or surgical, representing a differentiated profile for ACS care.

Although continuous inclusion was requested, it is possible that it has not occurred and those who died during the initial care may not have been included.

Clinical Implications

RBSCA is a robust registry, with a significant sample of ACS patients admitted to 23 hospitals in Brazil. This registry aimed to identify all inpatients, avoiding the unit individualization of this syndrome, which could compromise results, due to the difficulty found in diagnostic characterization. Data were collected through the internet, providing consistent information and preventing mistakes often committed when collecting written data. As the participating hospitals are tertiary institutions, these data must reflect the best treatment these patients receive in our country.

Conclusion

This ACS registry has had its partial findings previously disclosed both at national[10,20] and international level[11,21]. Its results, although with the usual limitations of comparisons, do not differ from data collected by other registries, inside and outside the country, being consistent with them.

Understanding these findings may help in mapping our inconsistencies and improving the planning of public and private care of ACS.

Appendix 1 - Hospitals, inclusions and researchers

Bahia: *Salvador* - Fundação Bahiana de Cardiologia (24) (A Rabelo Jr, E C Porto); Hospital Português (19) (M S Teixeira, J P Esteves). Minas Gerais: *Belo Horizonte* - Hospital Socor (2) (L R A Castro, J C F Garcia); Hospital Madre Tereza (173) (R L Marino, B C A Marino); *Juiz de Fora* - Santa Casa de Misericórdia de Juiz de Fora (567) (A J Muniz). Pará: *Belém* - Fundação Pública Estadual Hospital de Clínicas Gaspar Vianna (450) (H J L Reis, M S Carneiro). Paraná: *Maringá* - Hospital Santa Rita - Associação Beneficente Bom Samaritano (73) (R D Mora Jr, E K Hayashi); *Curitiba* - Hospital Universitário Evangélico de Curitiba (192) (P R F Rossi, C M C Branco). Pernambuco: *Recife* - Hospital Agamenon Magalhães (11) (J B M X Moraes Jr); Real Hospital Português (S T Montenegro) (9) . Rio de Janeiro: *Rio de Janeiro* - Hospital Barra D`Or (48) (A C B S Figueiredo, M A N Rati). Rio Grande do Sul: *Passo Fundo* - Hospital São Vicente de Paulo (19) (R T Tumelero, N T Duda); *Porto Alegre* - Hospital Mãe de Deus (30) (CP Jaeger, E R Manenti); Hospital São Francisco – ISCMPA (6) (P E Leães, C Blacher); Hospital São Lucas de PUCRS (104) (L C Bodanese, A V Azevedo). São Paulo: *São Paulo* - Hospital Israelita Albert Einstein (255) (M Knobel, M Makdisse); Instituto do Coração – HCFMUSP (12) (J C Nicolau, L M Baracioli); Instituto Dante Pazzanese de Cardiologia (439) (E S Santos, M P Pereira); Hospital do Coração – HCOR (17) (I M R Fernandes, E R Romano); *São José do Rio Preto* - Hospital de Base/Faculdade de Medicina de São José do Rio Preto (96) (L N Maia, M A B T Lemos); Instituto de Moléstias Cardiovasculares – IMC (60) (G V Greque, J C A Ayoub); *Campinas* - Hospital e Maternidade Celso Pierro – PUC Campinas (63) (J F K Saraiva, M L Paiva); *Marília* - Instituto do Coração and Santa Casa de Misericórdia de Marília (24) (A Rodrigues, J C F Braga).

Author contributions

Conception and design of the research: Piegas LS, Avezum A, Guimarães HP; Acquisition of data: Piegas LS, Avezum A, Guimarães HP, Muniz AJ, Reis HJL, Santos ES, Knobel M, Souza R; Analysis and interpretation of the data: Piegas LS, Avezum A, Guimarães HP, Souza R; Statistical analysis: Piegas LS, Souza R; Obtaining funding and Critical revision of the manuscript for intellectual content: Piegas LS; Writing of the manuscript: Piegas LS, Avezum A, Souza R.

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 study is not associated with any post-graduation program.

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