Original Article

Predictors of Hospitalization in Patients with Syncope Assisted in Specialized Cardiology Hospital

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Abstract

Background: Risk stratification of a syncopal episode is necessary to better differentiate patients needing hospitalization of those who can be safely sent home from the emergency department. Currently there are no strict guidelines from our Brazilian medical societies to guide the cardiologist that evaluate patients in an emergency setting.

Objectives: To analyze the criteria adopted for defining the need for hospitalization and compare them with the predictors of high risk for adverse outcome defined by the OESIL score that is already validated in the medical literature for assessing syncope.

Methods: A cross-sectional study of patients diagnosed with syncope during emergency department evaluation at our institution in the year 2011.

Results: Of the 46,476 emergency visits made in that year, 216 were due to syncope. Of the 216 patients analyzed, 39% were hospitalized. The variables associated with the need of hospital admission were - having health care insurance, previous known cardiovascular disease, no history of prior stroke, previous syncope and abnormal electrocardiograms during the presentation. Patients classified in OESIL scores of 0-1 had a greater chance of emergency discharge; 2-3 scores showed greater association with the need of hospitalization. A score $\geq$ 2 OESIL provided an odds ratio 7.8 times higher for hospitalization compared to score 0 (p <0.001, 95% CI:4,03-15,11). In approximately 39% no etiological cause for syncope was found and in 18% cardiac cause was identified.

Conclusions: Factors such as cardiovascular disease, prior history of syncope, health insurance, no previous stroke and abnormal electrocardiograms, were the criteria used by doctors to indicate hospital admission. There was a good correlation between the clinical judgment and the OESIL criteria for high risk described in literature. (Arq Bras Cardiol. 2013; 101(6):480-486)

Keywords: Syncope / etiology; Risk Factors; Hospitalization; Emergency Medical Services.

Introduction

Syncope corresponds to approximately 1.5% of emergency visits in the United States[1,2]. In Brazil there is no real estimation of emergency visits resulting from syncope.

Some of the causes of syncope are associated with relevant morbidity. The identification of such causes is crucial to better stratify patient risk of adverse events[1,2]. In these cases mortality can reach 18-33%[3] in one year. The differential diagnosis is extensive, and a definitive treatment strategy is aimed at the underlying cause, when it is detected. However, in emergency care, the etiology of syncope is often unknown management should be focused on risk stratification, to better differentiate those that can be discharged from those who require urgent intervention or hospital admission. In the United States, about 47% of patients treated in the emergency for syncope are discharged without diagnosis[4].

A good medical history associated with thorough physical examination (including blood pressure in supine and standing positions) and electrocardiographic study show combined diagnostic yield of 50% for causative diagnosis of syncope[5]. Electrocardiogram (ECG) can show abnormalities, such as conduction disorders, or old myocardial infarction, suggesting an etiology for the syncope; however, in only 5% of cases the cause is elucidated based only in ECG[5].

OESIL[6] (Osservatorio Epidemiologico sulla Sincope nel Lazio) and EGSYS[7] scores are widely used at the emergency level, as a tool to help decide which patient must be hospitalized. However, they were developed for use in general hospitals. These tools are unsuitable for use in hospitals that are exclusive for cardiology, since the presence of heart disease is always defined as a risk criterion that leads hospitalization[6,7].

To date, there is no information about the patients' profile treated for syncope in cardiac emergencies in our area. Neither do we know what are the hospitalization criteria applied by the physicians who evaluated these patients. In our country there is no guideline of medical society about this subject.

This study aims at the evaluation of the criteria adopted for hospitalization and differentiate them from those used in discharged patients. Subsequently, compare these criteria with those described in the literature as high risk predictors defined in risk scores already validated for syncope evaluation.

Methods

A cross-sectional study was performed in patients who received the diagnosis of syncope, through 10th revision of the International Statistical Classification of Diseases (ICD-10) R55, on the patients' charts of the emergency department at the Cardiology Institution, from January 1st to December 31 of 2011, in order to identify factors associated with hospitalization. For ICD-10 research, a search engine in the emergency care system from our institution was used, which is completely computerized, in which only one ICD-10 is allowed in order to define the patient's hospitalization cause.

The definition of syncope used in our study was the one recommended by the European Society of Cardiology (8). In their guideline, syncope is defined as an episode of transient loss of consciousness (nontraumatic) that occurs due to transient global cerebral hypoperfusion characterized by rapid onset, short duration and with complete spontaneous recovery.

We excluded patients that did not had their complete records in our computerized system, those under 18, pregnent women and those whose diagnosis was erroneously identified as syncope, according to anamnesis data described in the medical record.

In this study, we aimed at identifying in our population some of the main factors associated with a higher probability that cardiovascular disease is the cause of syncope, also including: age over 65, previous cardiac disease (coronary arterial disease, heart failure, valvulopathies, congenital cardiopathies, canulopathies, cerebrovascular disease, peripheral arterial disease), abnormal electrocardiogram, history of ventricular arrhythmia, history of cardiac arrest or aborted sudden death, presence or absence of prodromes[6-8]. Other variables, such as genre, diabetes, hypertension, syncope relation with emotional stress, medications and presence of health plan, were also investigated.

Further, it was conducted an analysis regarding which points of OESIL score[6] were present in our population, also if they showed statistical relevance in multivariate analysis, resulting in hospitalization. OESIL score ranges between 0 and 4, being composed of the arithmetic sum of the criteria: 1) age > 65 years; 2) history of cardiovascular disease; 3) abnormal electrocardiogram; 4) syncope without prodromes. Mortality increases in one year according with score: 0% for score 0; 0.8% for 1 point; 19.6% for 2 points; 34.7% for 3 points; 57.1% for 4 points. Patients with moderate to high risk (score higher or equal to 2), for presenting higher mortality in one year, are eligible for hospitalization and investigation of etiological cause.

For the definition of abnormal electrocardiogram, the following were considered: sinus bradycardia or sinus pause, atrioventricular block of second or third degree, conduction disturbances, fibrillation or atrial flutter, ventricular tachycardia, prolonged QTc interval, presence of inactive zone or ST-T acute abnormalities, ventricular pre-excitation, pacemaker rhythm or pacemaker dysfunction.

Statistical Analysis

Continuous variables were described in mean ± standard deviation. Categorical variables were presented as absolute number and percentage. Univariate comparisons were conducted with χ^2, two-tailed Z test or T test, as appropriate. Logistic regression was performed, using a model in which variables were included with Backward method (probability), having as entry criteria a p value of 0.05 and a removal value of 0.20 in regression analysis. For the model, we selected variables that compose risk scores for syncope and also those that showed statistical difference in univariate analysis, deemed as relevant by investigators. Database was elaborated using the program Microsoft Office Excel 2010 for Windows® and then transferred to program IBM SPSS Statistics version 19.0.0 (Armonk, NY: IBM Corp.).

Ethical considerations

The study was registered at the research unit of the Cardiology Institute, University Cardiology Foundation of Rio Grande do Sul, having been approved for implementation by the ethics research committee of our institution, according to the Declaration of Helsinki.

Results

In 2011 46,476 medical visits were performed on the emergency room of our Institution. ICD-10 R55 - syncope - was applied in a total of 356 patients. Of these, 63 patients were excluded for not having syncope, 86 were excluded for being hospitalized directly in the ward by their physician discretion, without emergency care (there was a medical record, but no medical consultation), and, finally, nine patients were excluded for being under 18. A total of 216 patients was examined.

Of the cases seen by syncope, 39% were admitted for investigation. Table 1 describes the patient profile, already stratified between those who were hospitalized and those who were released from the emergency.

Table 2 shows the result of multivariate analysis between these two groups, identifying factors most strongly related to hospitalization for syncope.

In the comparative evaluation between hospitalized and non-hospitalized groups, OESIL scores of 0 and 1 were significantly associated with higher probability of patient discharge. Similarly, scores 2 and 3 were related to higher probability of hospitalization. Score 4 had no relevant association, possibly due to the low number of patients with this score (Table 3). In a multivariate analysis, controlled for factors that are not part of OESIL score, patients with score equal to or higher than 2 had an odds ratio 7.8 times higher

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Table 1 - Clinical characteristics between patients discharged from the emergency visit and those hospitalized due to syncope in the year 2011

	Nonhospitalized (n = 131)	Hospitalized (n = 85)	p
Age (years)	59.2 ± 20	67.0 ± 18	0.003
Ejection fraction (%)	51.4 ± 18.4	59.3 ± 15.7	0.162
Male	51.6%	62.4%	0.120
SUS health plan	76.6%	61.2%	0.016
SAH	50.8%	75.3%	< 0.001
Diabetes	8.4%	16.5%	0.07
Known heart pathology	23.4%	57.6%	< 0.001
CAD	14.8%	42.9%	< 0.001
CCI	4.7%	21.4%	< 0.001
Abnormal ECG	43.8%	67.1%	0.001
Previous CVA	7%	5.9%	0.110
Valvulopathy	3.9%	3.5%	0.887
Pacemaker	3.9%	7.1%	0.299
Previous syncope	21.9%	40.5%	0.004
Smoking	12.5%	10.6%	0.671
Alcoholism	0%	1.2%	0.219
Previous CRA/VT/VF	0%	2.4%	0.081
Congenital cardiopathy	0.8%	3.5%	0.148
Prodromes	60.2%	47.1%	0.060
Chest pain	4.7%	23.5%	< 0.001
Dyspnea	2.3%	3.5%	0.609
Palpitations	3.9%	5.9%	0.504
Dizziness	32.8%	32.9%	0.984
Emotional stress preceding syncope event	11%	1.2%	0.006
Headache	4.7%	5.9%	0.700
Syncope related to exertion	2.3%	7.1%	0.087
Anemia	0.8%	4.7%	0.064
CCI* physical examination	1.6%	3.5%	0.353
Physical examination, cardiac murmur identified in the emergency visit	8.6%	11.8%	0.447
Physical examination, focal neurological deficit	3.9%	2.4%	0.533
Antihypertensive	46.1%	74.1%	< 0.001
Diuretics	22.7%	38.8%	0.011
Beta-blocker	25%	47.1%	0.001
iACE/ARB	31.3%	60%	< 0.001
Calcium blocker	7%	16.5%	0.030
Alfa-blocker	3.1%	2.4%	0.739
Vasodilator	1.6%	9.4%	0.008
Digital	1.6%	4.7%	0.175
Amiodarone	0.8%	4.7%	0.064
Need transitory PM	0%	1.2%	0.219
Need final PM/ICD	0%	28.2%	< 0.001

CVA: cerebral vascular accident; ARB: angiotensin receptor blocker; ICD: implantable cardiodefibrilator; CAD: coronary artery disease; ECG: electrocardiogram; VF: ventricular fibrillation; SAH: systemic arterial hypertension; CHF: congestive heart failure; iACE: inhibitor of angiotensinogen-conversion enzyme; PM: pacemaker. CRA: cardiorespiratory arrest. SUS: Sistema Único de Saúde (Single Health System); VT: ventricular tachycardia.
* Presence of a third or fourth heart sound, signals of pulmonary and/or systemic venous congestion or difficult breathing, ascites and dyspnea.

Table 2 - Predictor factors for hospitalization - multivariate analysis

Variable	Odds ratio (OR)	p	95% CI for OR	
			Inferior	Superior
Previous syncope	2.4	0.015	1.18	4.92
Heart disease	5.5	<0.001	2.70	11.42
Previous CVA	0.2	0.033	0.05	0.88
Abnormal ECG	2.0	0.039	1.03	3.92
Health insurance	2.5	0.010	1.24	5.11

CVA: cerebral vascular accident; ECG: electrocardiogram; CI: confidence interval.
Logistic regression with Backward model using the following variables: abnormal ECG, previous CVA, heart disease, previous syncope, DM2, health insurance, related to exercise, emotional stress, CRPVTVF, physical examination, hypotension TAS < 90 mmHg, prodromes.

of hospitalization compared to those with score 0 (p < 0.001, CI 4.03-15.11).

As for syncope etiology, it was observed in this population that approximately 39% of patients had no etiology defined. In 18% a cardiology cause was identified (Chart 1). Among cardiology causes, we have 13 cases of tachyarrhythmias, bradyarrhythmias 17, three structural heart disease (myocardial hypertrophy, right ventricular arrhythmogenic cardiomyopathy), two of pacemaker dysfunction, two of acute coronary syndromes and two due to valvulopathies.

Besides electrocardiogram, electrocardiographic monitoring in the emergency and echocardiography, some other form of examination was held in our sample during hospitalization. With reference to these procedures, electrophysiological study was performed in 12.5% of cases, cardiac catheterization in 12%, a 24-hour Holter monitoring in 6%, carotid ultrasound in 4%, myocardial scintigraphy in 3% and HUT (tilt-test) in 0.5%.

Discussion

Analysis of 216 patients in the emergency department at our hospital revealed that most of them were older than 50 and there was equal distribution between sexes. The finding that patients with previous heart disease and abnormal electrocardiogram have greater probability of hospitalization is in accordance with information from the literature, suggesting a higher risk associated with these variables[1-4,6,8].

An interesting observed data is the existence of health insurance, as independent variable, was associated with a greater chance of hospitalization. That, in the authors' opinion, may be due to increased pressure imposed for admission upon emergency physicians to assist this group of patients or, perhaps, to greater availability of private beds in public and private institutions. However, the real reason for this rationale was not completely clear.

European guidelines on diagnosis and treatment of syncope 2009(8) considered high risk criteria the presence of structural heart disease , coronary artery disease, clinical and electrocardiographic abnormalities and the presence of major comorbidities. Considering these criteria, we can infer that, in the population studied, there was a agreement among the high-risk criteria indicated in the guidelines and those that were associated with a greater chance of hospitalization in our sample.

Low prevalence of low risk patients hospitalized (OESIL scores 0 and 1) demonstrates that, despite of not having an institutional protocol for assisting these patients in our emergency department, evaluating risk criteria separately seems to be properly carried out by cardiologists attending the emergency unit. This finding makes us evoke the idea that scores as OESIL appear to have greater practical utility in emergencies at general hospitals (where they were initially developed and validated), perhaps being unnecessary in cardiac emergencies, where only specialists evaluate and select patients.

Table 3 - Classification of patients stratified by OESIL score divided between patients hospitalized and those discharged from emergency visit

OESIL	Nonhospitalized		Hospitalized	
	N	(%)	N	(%)
0	40	31,0%*	4	4,9%
1	Z40	31,0%*	8	9,8%
2	25	19,4%	37	45,1%*
3	16	12,4%	22	26,8%*
4	8	6,2%	11	13,4%

Chi-square test <0.001.
* Z test for comparison of proportions of the columns found a relevant difference between groups using Bonferroni correction (p < 0,005). OESIL: Osservatorio Epidemiologico sulla Sincope nel Lazio[6].
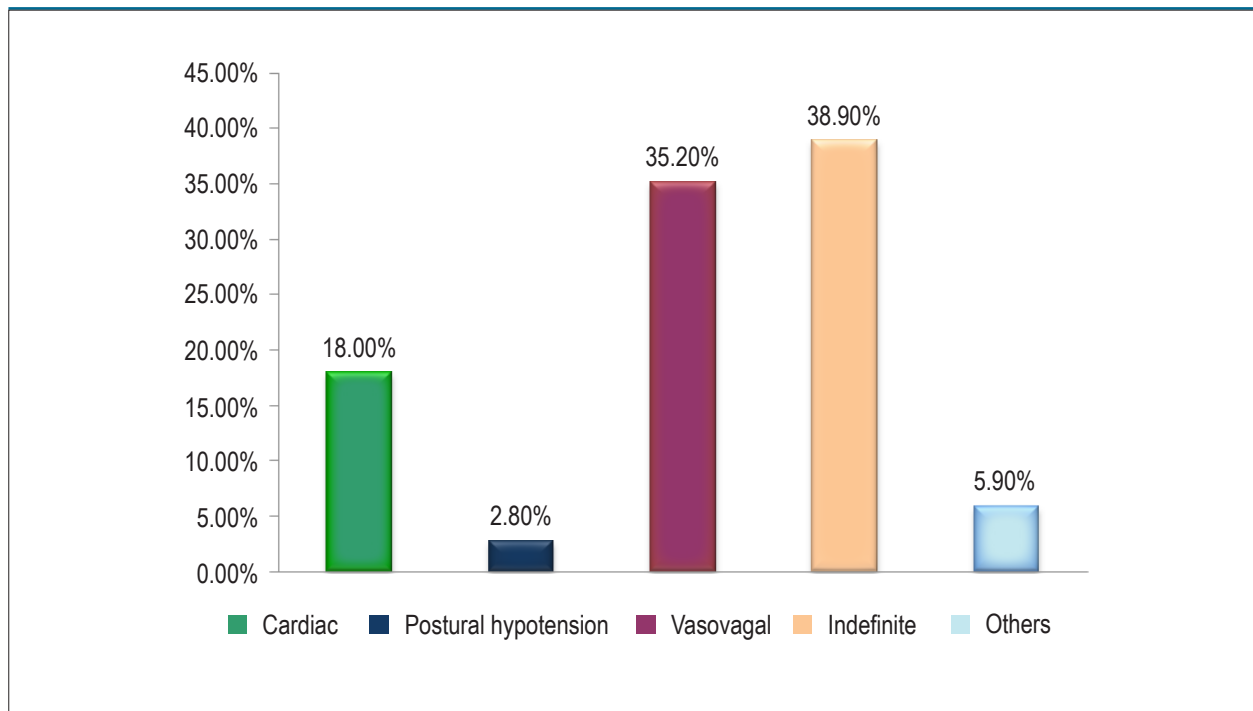
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Chart 1 - *Prevalence of syncope etiologies in emergency visits in the year 2011.*

In a review of the risk assessment of patients with syncope in emergency sectors, was stated that, although there are many scores to stratify patients, most of them have good sensitivity and low specificity, and the balance between these variables, which would add safety in patients' hospitalization or discharge, would be unattainable. An interesting conclusion of this review was that emergency physicians were quite sensitive and tended to hospitalize patients who developed severe clinical outcomes, including those who were not included in risk stratification scores[9].

Other criteria used in scores - some even classified as highest scoring criteria - such as palpitations, pre- syncope, syncope during physical exertion, valvulopathies, dyspnea and physical examination revealing signs of heart failure revealed no statistical significance for hospitalization in our sample[10,11]. This fact demonstrates how much scores can vary among themselves having a low external validity. However, these factors previously mentioned occurred with low frequency in our population, probably leading to a beta error. Another possibility, which must certainly explains this phenomenon, is that a cardiologist, when attending a patient with syncope and an ejection murmur at the base of the heart that irradiates to the carotids, most likely would add as a cause for hospitalization the ICD-10 for aortic stenosis instead of that for syncope. This same phenomenon may occur with patients who arrive at the Emergency with acute decompensated heart failure.

Our data are in accordance with the literature regarding the causative diagnosis of the syncopal event. Vasovagal (reflex-mediated) was the most prevalent diagnosis followed by undetermined and cardiac cause for the syncope[8,12]. The number of referrals to emergency due to syncope is of approximately 1%[8,13,14], in our population this number was slightly lower, being 0.5%. This fact may reflect those patients in which ICD-10 of the final diagnosis of the syncope event (e.g. aortic stenosis) has been used in the emergency medical chart. The rate for hospitalization due to syncope in our institution is in accordance with other studies (approximately 40%)[12-14], being 39% in our series.

Important limitations of our study are: underreporting in medical records, the fact that other pathologies - such as arrhythmias, heart failure - could manifest with syncopal episodes and the ICD-10 used could have been related to the respective pathologies while filling out the medical record, instead of being one related to syncope, as previously explained. However, this type of bias is inherent to studies with historical basis. Another limitation is the fact that we have excluded patients under 18. This decision may underestimate the real prevalence of patients with canulopathies, myocardial hypertrophy, Wolff-Parkinson-White, congenital cardiopathies and other cardiovascular pathologies characteristic of a young population. However, the number of patients excluded from the study was only nine, which probably would not be significant to define data related to syncope in young and pediatric patients.

Conclusion

Factors such as cardiovascular disease, prior history of syncope, health insurance, no previous stroke and abnormal electrocardiogram changes were the criteria most strongly associated with the likelihood of hospitalization when presenting with a syncopal episode. In a referral hospital for cardiovascular diseases, there was good agreement beteween

clinical criteria for hospitalization with those high risk criteria already described in the medical literature.

Author contributions

Conception and design of the research: Fischer LM, Dutra JPP, de Lima GG, Leiria TLL; Acquisition of data and Analysis and interpretation of the data: Fischer LM, Dutra JPP, Mantovani A, de Lima GG, Leiria TLL; Statistical analysis: de Lima GG, Leiria TLL; Writing of the manuscript and Critical revision of the manuscript for intellectual content: Fischer LM, Dutra JPP, Leiria TLL.

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