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Precipitating factors of decompensation of heart failure related to treatment adherence: multicenter study-EMBRACE

Fatores precipitantes de descompensação da insuficiência cardíaca relacionados a adesão ao tratamento: estudo multicêntrico-EMBRACE

Factores desencadenantes de descompensación de la insuficiencia cardiaca relacionados con la adhesión al tratamiento: estudio multicéntrico-EMBRACE

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ABSTRACT

Objective: To describe the precipitating factors of heart failure decompensation between adherent and non-adherent patients to treatment.
Methods: Cross-sectional study of a multicenter cohort study. Patients over 18 years of age with decompensated heart failure (functional class III/IV) were eligible. The structured questionnaire was used to collect the data and evaluate the reasons for decompensation. The irregular use of medication prior to hospitalization and inadequate salt and fluid intake were considered as poor adherence to treatment.
Results: A total of 556 patients were included, mean age 61 ± 14 years old, 362 (65%) male. The main factor of decompensation was poor adherence, representing 55% of the sample. Patients who reported irregular use of medications in the last week had a 22% greater risk of being hospitalized due to poor adherence than the patients who adhered to treatment.
Conclusion: The EMBRACE study showed that in patients with heart failure, poor adherence was the main factor of exacerbation.
Keywords: Heart failure. Multicenter study. Precipitating factors.

RESUMO

Objetivo: Descrever os fatores precipitantes de descompensação da insuficiência cardíaca entre pacientes aderentes e não aderentes ao tratamento.
Métodos: Estudo transversal de uma coorte multicêntrica. Pacientes acima de 18 anos com insuficiência cardíaca descompensada (classe funcional III/IV) foram elegíveis. Para a coleta dos dados foi utilizado um questionário estruturado avaliando os motivos da descompensação. O uso irregular de medicação prévio à internação, controle inadequado de sal e líquidos foram considerados como grupo de má adesão ao tratamento.
Resultados: Foram incluídos 556 pacientes, com idade média de 61±14 anos, 362(65%) homens. O principal fator de descompensação foi a má adesão, representando 55% da amostra. Os pacientes que referiram o uso irregular das medicações na última semana apresentaram 22% mais risco de internação por má adesão quando comparados aos pacientes aderentes.
Conclusão: O estudo EMBRACE demonstrou que em pacientes com insuficiência cardíaca, a má adesão mostrou-se como o principal fator de exacerbação.
Palavras-chave: Insuficiência cardíaca. Estudo multicêntrico. Fatores desencadeantes.

RESUMEN

Objetivo: Describir los factores desencadenantes de descompensación de la insuficiencia cardíaca entre pacientes adherentes y no adherentes al tratamiento.
Métodos: Estudio transversal de cohorte multicéntrica. Pacientes mayores de 18 años con insuficiencia cardiaca descompensada (clase funcional III / IV) fueron elegibles. Para la recolección de los datos se utilizó un cuestionario estructurado que evalua los motivos de la descompensación. El uso irregular de medicación previa a la internación y control inadecuado de sal y líquidos fueron considerados como grupo de mala adherencia al tratamiento.
Resultados: Se incluyeron 556 pacientes, con una edad media de 61 ± 14 años, 362 (65%) eran hombres. El principal factor de descompensación fue la mala adherencia, representando el 55% de la muestra. Los pacientes que indicaron el uso irregular de las medicaciones en la última semana presentaron un 22% más de riesgo de internación por mala adherencia en comparación con los pacientes adherentes.
Conclusión: El estudio EMBRACE demostró que en pacientes con insuficiencia cardíaca, la mala adherencia se mostró como el principal factor de exacerbación.
Palabras clave: Insuficiencia cardíaca. Estudio multicéntrico. Factores desencadenantes.

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INTRODUCTION

Hospitalizations due to heart failure (HF) are considered a global health problem. In the United States, more than 1 million admissions were recorded in one year, with a 25% readmission rate in 30 days, a mortality rate of around 30% in a year and 30 billion in hospital costs[1-2]. In Brazil, approximately 39% of hospital admissions are related to decompensated HF. This proportion is more prevalent, around 70% in the population over 60 years[3]. The study Brazilian Registry of Heart Failure (BREATHE)[4] showed the intra-hospital mortality rate is around 13% in patients admitted for HF. If we compare these numbers with global data, in the United States, for example, this rate is around 3%[5].

Consequently, the precipitating factors of decompensated HF, admission and readmission rate and interventions strategies to reduce outcomes have been increasingly studied. Although most works focus on the prognostic importance of HF, understanding the factors related to adherence is decisive for treatment[6]. According to the American Heart Association, adherence to treatment is considered an important self-care component for improving outcomes in the context of HF[7]. Based on these affirmations, data of studies indicate low rates of adherence to pharmacological and non-pharmacological treatment are a strong predictor of hospitalizations related to HF[8-9]. Moreover, they are associated with the increased risk of mortality from all causes[10].

In view of the evidence highlighted in national and international literature and the magnitude of this panorama, it is necessary to describe the precipitating factors of decompensated HF in adherent and non-adherent patients.

METHODS

Study design

A cross-sectional study of a multicentric cohort study entitled ***E****studo* ***M****ulticêntrico* ***BRA****sileiro para Identificar os Fatores Pre****C****ipitantes de Int****E****rnação e Reinternação de Pacientes com Insuficiência Cardíaca* (Brazilian Multicentric Study to identify Precipitating Factors for the Admission and Readmission of Patients with Heart Failure) – EMBRACE[9]. Two centers in southern Brazil (1 and 2) and one center in northeastern Brazil (3), considered centers of reference for patients with HF, participated in this study.

Study population

Eligible patients were admitted for decompensated HF, class III or IV, according to the classification of New York Heart Association (NYHA), with ejection fraction ≤ 45%, aged ≥ 18, both sexes. Patients with HF after acute myocardial infarction in the three months prior to admission; patients with HF secondary to sepsis; patients undergoing myocardial revascularization in the 30 days prior to hospitalization and patients with cognitive sequelae.

Data collection

A structured, standardized questionnaire was used to collect data on patient identification, demographic and clinical variables and the issues related to reasons for decompensated HF. Data were collected from March 2010 to January 2011. Patients with a history of irregular use of medication prior to admission and inadequate salt and fluid intake were considered as being the group with low adherence to treatment. Those for which the cause was identified as acute coronary syndrome, arrhythmia, infection, pulmonary embolism or thyroid dysfunction were classified as admission due to other causes. These two groups guided the analyses of this study.

Ethical consideration

This study was approved by the ethics committees of the institutions involved, filed under opinion number 06-032, in accordance with the Declaration of Helsinki. The patients agreed to participate in the study by signing an informed consent statement.

Data analysis

The Statistical Package for the Social Sciences (SPSS) version 19.0 was used for the statistical analyses. A two-sided P value less than 0.05 was considered statistically significant. Poisson regression was used for the statistical analysis with adjustments for robust variances and the generalized estimating equation was used to adjust the standard errors per center. Comparisons between the groups for sociodemographic and clinical characteristics were performed using the Chi-square test, the t-test and Mann-Whitney, as considered appropriate. Continuous variables were expressed as mean and standard deviation or median and interquartile range interval.

RESULTS

In all, 556 patients were included in the study. Most of the patients were in Center 1 (54%), followed by 2 (27%) and 3 (19%), with an average age of 61 ± 14 years, and 362

(65%) were men. The ischemic etiology was the most prevalent and the average ejection fraction of the left ventricle was 29±8%. Most of the patients lived alone and 50% of the sample had up to five years of school education. Poor adherence was the main reason for decompensated HF, representing 55% of the sample. Decompensated HF due to other causes formed the second group. There was no statistically significant difference in the variables sex, ethnicity/race and ischemic etiology. The remaining data are shown in Table 1.

Table 1 - Socio-demographic and Clinical Characteristics of patients with decompensated HF. Porto Alegre, RS, Brazil, 2012

Variable	Poor adherence n = 307	Other causes n = 249	P value
Age, years*	61.4±13.9	60.9±14.7	0.164
Sex, male†	211(68.7)	151(60.6)	0.047
Does not live alone†	265(86.3)	221(89.1)	0.321
Schooling, years‡	5(2-8)	5(1-8)	0.169
Ethnicity/Race, white†	220(71.7)	151(60.6)	0.002
Etiology, ischemic†	100(32.6)	104(41.8)	0.023
Etiology, hypertensive†	100 (32.6)	76(30.5)	0.668
Etiology, valvar†	22(7.2)	30(12)	0.202
Etiology, Chagas†	16(5.2)	15 (6)	0.643
LV ejection fraction (%)*	28.8±7.9	29.4±8.1	0.628
Functional class†			
III	163(53.3)	144(58.8)	0.196
IV	143(46.7)	101(41.2)	0.196
Creatinine (mg/dL)‡	1.27(0.96-1.71)	1.22(0.90-1.69)	0.388
Hemoglobin (g/dL)†	12.9(4.1)	12.5(4.1)	0.350
Time of disease, days‡	32.2(1-365)	27.8(0-725)	0.584
Does treatment for HF†	273(88.9)	215(86.3)	0.028

Source: Research data, 2012.
* Mean ± standard deviation; † n (%) ‡ median (25-75 percentile); KV - Left Ventricle; HF - heart failure.

Table 2 shows the adjusted values of the clinical variables of patients hospitalized for decompensated HF, analyzed according to the regression model. According to this model, four variables showed a significant statistical difference compared to other groups. The ischemic etiology was presented as a protective factor, and ischemic patients had a 19% lesser risk of being admitted due to poor adherence. Patients who reported the irregular use of the medications in the last week had a 22% higher risk of being admitted for poor adherence than patients who used medication regularly. Similarly, patients who stopped using medication after they felt better had a 19% greater risk of being admitted for poor adherence than the others. Patients who did not relate tiredness with the worsening of the disease had an 11% lesser risk of being admitted for poor adherence.

Patients were followed up during hospitalization and classified according to the observed clinical worsening of the condition (Table 3). A 40% lesser risk of death was observed in the patients admitted due to poor adherence compared to other causes of decompensated HF.

Table 2 - Clinical variables of patients hospitalized for decompensated heart failure: Gross and adjusted values according to the Poisson regression model. Porto Alegre, RS, Brazil, 2012

Variable	Total* n = 556	Gross Value PR (CI 95%) P	Adjusted Value PR (CI 95%) P
Sex, male	362(65.1)	1.18(1.03-1.35) 0.02	1.11(0.97-1.27) 0.14
Skin color			
White	371(66.7)	1.00	1.00
Black	89(16)	0.93(0.84-1.02) 0.14	0.86 (0.70-1.05) 0.14
Brown	96(17.2)	0.67(0.54-0.82) <0.001	0.91(0.82-1.00) 0.06
Etiology, ischemic	204(37.2)	0.83(0.71-0.96) 0.01	0.81(0.69-0.95) 0.01
Paroxysmal nocturnal dyspnea	471(84.7)	1.37(1.18-1.59) <0,001	1.21(0.96-1.53) 0.11
Irregular use of medications in the last week	154(27.6)	1.26(1.10-1.45) 0.001	1.22(1.02-1.46) 0.03
Stopped taking medication when felt better	76(13.6)	1.38(1.26-1.52) <0.001	1.19(1.07-1.32) <0.001
Relates importance of weight in treatment	173 (31.1)	1.59(1.15-2.21) 0.005	1.12(0.90-1.40) 0.32
Related congestion with orthopnea	179(32.1)	1.73(1.04-2.86) 0.03	1.14(0.72-1.79) 0.57
Related congestion with swelling of the extremities	259(46.5)	2.04(1.76-2.37) <0.001	1.45(0.83-2.54) 0.19
Related congestion with PND	157(28.2)	2.00(1.36-2.95) <0.001	1.33(0.97-1.83) 0.07
Does not relate tiredness with the worsening of the disease	269(48.3)	1.77(1.31-2.38) <0.001	0.89(0.83-0.94) <0.001

Source: Research data, 2012.
* n (%); PND - paroxysmal nocturnal dyspnea; PR - Prevalence ratio; CI - confidence interval; Test - Poisson Regression; Gross value from univariate regression; adjusted, from multivariate regression.

Table 3 - Intra-hospital evolution of patients hospitalized for decompensated heart failure: Values adjusted according to the Poisson regression model. Porto Alegre, RS, Brazil, 2012.

Variable	Poor adherence* n = 307	Other causes* n = 249	Adjusted Value PR (CI 95%)	P value
Need for MV	15(4.9)	20(8)	0.60(0.33-1.08)	0.093
Hemodialysis	8(2.6)	8(3.2)	0.80(0.54-1.20)	0.30
Admission ICU	37(12.1)	36 14.5)	0.83(0.52-1.31)	0.60
Use of Inotrope	25(8.1)	28(11)	0.72(0.45-1.14)	0.16
Death	18(5.9)	24(9.6)	0.60(0.58-0.63)	<0.001

Source: Research data, 2012.
* n (%) MV - mechanical ventilation; ICU = intensive care unit; PR - prevalence ratio; Test - Poisson Regression adjusted by center.

DISCUSSION

This study presents innovative data in Brazil by identifying some of the main precipitating factors of decompensated HF. The findings reveal that most patients admitted in the centers for exacerbation of HF had adhered poorly to treatment.

Drug therapy is one of the key parts of treating HF. Consequently, non-adherence to treatment directly affects the clinical outcomes and increases the risk of hospital-

ization and death[11]. A systematic review that assessed the efficacy of interventions in patients with HF showed the improvement of at least one recommendation, whether adherence to treatment or a shift in lifestyle, reduce the risk of mortality by 2% and reduce the likelihood of hospitalization by 10%[12].

The complex therapeutic plan and the high number of prescription drugs are variables that cause confusion in patients in terms of adherence[13]. The findings of this study indicate that the irregular use of medication and the interruption of drug therapy are significantly associated with the risk of hospitalization. The literature shows similar data to the findings of this study. In one review, the rate of non-adherence to medication ranged from 40% to 60%, and some studies revealed even greater variations, from 10% to 92%, depending on the adopted assessment tool[14].

The lack of adherence to pharmacological treatment must also be the focus of attention. However, in some cases, the data in literature are controversial, thus jeopardizing the guidelines available to health workers. Regarding the daily sodium intake requirement, for example, a precise recommendation in the healthcare guidelines is limited[2,15] since some studies indicate the benefits of restricting sodium intake[16] while others present better outcomes when daily sodium consumption is not restricted[17].

Adherence is also influenced by factors that are inherent to HF, especially the multiple associated comorbidities and, above all, the recognition of signs and symptoms of the disease. The literature discusses a range of factors related to reducing the hospital admission rate for HF. One of these factors is the variable "deficient knowledge of the disease" and its direct relationship with readmission rates[18]. The delay in perceiving the signs and symptoms of HF is associated with exacerbation of the disease and delays in Interventional management[19]. In contrast, in this work, the patients who did not relate tiredness with worsening of the disease had an 11% lesser risk of being admitted for poor adherence.

Another result to be discussed in this study is the reduced risk of death in patients hospitalized for poor adherence. This finding can be explained by the fact that the data were analyzed by comparing this group with the group admitted for other causes, which includes diseases believed to be greater predictors of mortality in HF. The reduction of clinical outcomes in the context of HF depends on an individualized management of pharmacological and non-pharmacological interventions that observes the complexity of the proposed therapy. In addition, the research practices in future studies should include innovative healthcare technologies and new assessment tools that prioritize adherence to treatment[20].

CONCLUSION

The profile of patients admitted for decompensated HF was white men, over 60, with a median of five years of schooling, living with a partner and with a diagnosis of HF with reduced ejection fraction. Half of the emergency admissions were due to poor adherence to treatment, especially the irregular use of medication. Admissions due to poor adherence to treatment evolved with a lower rate of intra-hospital death in comparison with admissions for other causes and the ischemic etiology of HF was considered a protective factor for admissions due to decompensated HF.

In the context of education and care, the focus of nurses for patients with HF should include factors related to assessing the effectiveness of therapy and the patient's ability to understand and implement adherence strategies. The nursing process, the classification systems and innovative technologies are tools nurses can use to reduce outcomes and improve the quality of life of patients.

The limitation of this study is the inclusion of centers considered reference units for patients with HF, which could represent a different scenario to that of other centers.

Potential conflict of interest

The authors declare that there is no conflict of interest.

Academic relations

This study is not linked to any graduate programs.

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