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Risk Factors for Delayed Discharge due to Social Factors: A Retrospective Study

Fatores de Risco para Alta Prorrogada por Motivos Sociais: Um Estudo Retrospectivo

Miguel MARTINS✉[1], António MESQUITA[1], Lucas CARVALHO[2], Francisca MARTINS[1], Mariana SILVA[1], Helena LEITÃO[2], Miguel NUNES[1]
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ABSTRACT

Introduction: The hospital setting faces a rate of bed occupation by patients whose discharge is limited by other factors apart from clinical needs. This urges the need for an early identification of the patients at risk of delayed discharge due to social factors in order to reduce expenses and to add value that converts itself into the patient health. The aim of this study was to identify the demographic and clinical factors that may be associated with delayed discharge.

Methods: Demographic and clinical comorbidity data on 582 patients of an internal medicine ward from a tertiary hospital center during the years 2018 and 2019 was analyzed. A binomial logistic regression model was used, adjusted for sex, age, and length of clinical stay, in order to identify potential risk factors associated with delayed discharge.

Results: A total of 473 patients admitted in the internal medicine ward throughout the two years of study were included. Ninety-four (19%) of these patients had their discharge delayed beyond their clinical needs; sixty-four (68%) of these were females. The most representative age was between 75 - 89 years old (45.7%). The characteristics that significantly differed between both non-delayed and delayed discharge were female sex (OR 2.84, 95% CI 1.65 – 4.90, *p*-value < 0.05), prolonged clinical stay (OR 2.64, 95% CI 1.60 – 4.937, *p*-value < 0.05) and diabetes mellitus (OR 1.87, 95% CI 1.08 – 3.23, *p*-value < 0.05). Besides these, the presence of heart failure (OR 0.52, 95% CI 0.27 – 0.99, *p*-value < 0.05) and chronic kidney disease (OR 0.34, 95% CI 0.14 – 0.86, *p*-value < 0.05) were associated with a lower risk of delayed discharge.

Conclusion: Female sex, a prolonged clinical stay and diabetes mellitus were associated with a higher risk of delayed discharge, while heart failure and chronic kidney disease were associated with a reduced risk. These findings create a basis for a possible future multicentre study aimed at creating a clinical prediction rule to stratify the risk of delayed hospital discharge in the Portuguese population.

Keywords: Hospital Costs; Internal Medicine; Length of Stay; Patient Discharge; Portugal; Risk Factors; Social Vulnerability

RESUMO

Introdução: Os hospitais deparam-se com uma percentagem das suas camas ocupadas por doentes cuja alta hospitalar está limitada não pela alta clínica, mas por outros fatores. Cria-se a necessidade da identificação precoce dos indivíduos que estão em risco de uma alta prorrogada por motivos sociais (internamentos sociais - IS), de forma a reduzir gastos e a acrescentar valor que se traduza em saúde dos utentes. O objetivo deste estudo foi identificar os fatores de risco demográficos e clínicos que condicionam risco de internamento social.

Métodos: Foram analisados 582 internamentos referentes a um serviço de Medicina Interna de hospital terciário nos anos de 2018 e 2019, e consideradas as características demográficas e comorbidades clínicas dos doentes. Foi feita uma regressão logística binominal ajustada ao sexo, idade e internamento clínico prolongado, para identificação de potenciais fatores de risco associados a alta prorrogada.

Resultados: Foram incluídos neste estudo um total de 473 doentes admitido no serviço no período de dois anos em estudo. Noventa e quatro (19%) doentes tiveram a sua alta prorrogada, dos quais 64 (68%) eram do sexo feminino. As principais características estatisticamente significativas associadas a maior risco de prorrogação da alta foram o sexo feminino (OR 2,84, 95% IC 1,65 – 4,90, *p-value* < 0,05), o internamento clínico prolongado (OR 2,64, 95% IC 1,60 – 4,937, *p-value* < 0,05) e a diabetes *mellitus* (OR 1,87, 95% IC 1,08 – 3,23, *p-value* < 0,05); para além destes, a presença de insuficiência cardíaca (OR 0,52, 95% IC 0,27 – 0,99, *p-value* < 0,05) e de doença renal crónica (OR 0,34, 95% IC 0,14 – 0,86, *p-value* < 0,05) associaram-se a um risco inferior de prorrogação de alta.

Conclusão: O sexo feminino, os internamentos clínicos prolongados e diabetes *mellitus* associaram-se a um maior risco de internamento social, enquanto a insuficiência cardíaca e a doença renal crónica se associaram a um risco inferior de IS. Estes achados servem de base de construção para um futuro estudo multicêntrico para criação de uma regra de predição clínica para estratificação do risco de internamento social na população portuguesa.

Palavras-chave: Alta do Doente; Custos Hospitalares; Factores de Risco; Medicina Interna; Portugal; Tempo de Internamento; Vulnerabilidade Social

INTRODUCTION

A large number of hospital beds are currently occupied by patients with no clinical justification for hospitalisation, requiring a prolonged length of stay for different reasons. These admissions are usually referred to as social admissions (SAs) - admissions in which discharge is extended beyond the clinical discharge. According to the 2017 – 2019 Barometer of Social Admissions (*Barómetro de Internamentos Sociais*), presented by the Portuguese Association of Hospital Administrators, approximately 4-6% of hospital beds and an average length of stay of 60-90 days were found. These figures can be extrapolated to an annual national expenditure of over €83M.[1,2]

Prolonged length of stay beyond the clinical requirements leads to an increase in potentially avoidable

1. Unidade Funcional Medicina 2.3. Hospital Santo António dos Capuchos. Centro Hospitalar Universitário de Lisboa Central. Lisboa. Portugal.
2. Faculdade de Medicina e Ciências Biomédicas. Universidade do Algarve. Faro. Portugal.
✉ **Autor correspondente:** Miguel Martins. miguelfrsmartins@gmail.com
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complications including nosocomial infections, impairment in care dependency and mental health of patients.[3-6] In addition to the individual impact, this bed occupancy also has an impact on elective hospitalisations, since maintaining occupancy rates above the recommended level leads to the postponement of scheduled activity, with increased costs, waiting lists and healthcare impairment.[4]

Even though this is a complex issue, the causes are focused on organisational and social issues, involving the lack of response from the National Network for Integrated Continuing Care (*Rede Nacional de Cuidados Continuados Integrados* - RNCCI) and family disabilities, whether the latter are socio-economic or related to adapting to the dynamics required by patient reintegration.[4,7,8] However, despite the relevance of the problem, quantitative data on the different dimensions of this issue at a national level are scarce, preventing any adequate targeted action.

Giraldo *et al.* and Gaughan *et al.* hypothesize that, in addition to the above-mentioned factors - external to the hospital - the internal system itself and procedural inefficiencies may have a contribution, namely delays in discharge plans, medical errors, lack of qualified human resources, etc.[4,6]

In 1978, Schrager *et al.* have found that an early identification and signposting of new elderly patients within the first 48 hours enabled these patients to be discharged from hospital five days earlier, compared to patients without a social assessment.[9] These findings showed that the need for early intervention and the reduction of unwarranted hospital occupancy has been an important issue for decades. However, to enable any effective intervention, it is necessary to characterize the process and the patients at risk, in addition to the promotion of decisions based on data and facts. This is a need not only identified, but desired by hospitals, and the characterisation and identification of demographic and clinical factors is crucial.[5,10]

A total of 582 patients admitted to an internal medicine department in a Portuguese tertiary hospital were included in this retrospective observational study, aimed at assessing the hypothesis of an association between specific clinical and demographic factors and a higher risk of SA. The identification of clinical risk factors will support an early action when admitting patients whose risk profile coincides with the findings of the study, enhancing the stratification of priorities in the preparation for discharge and supporting the appropriate protocols for supporting the patients and their transfer to the community. The main objective of this study was the assessment of clinical and demographic characteristics that could represent potential risk factors for SA in this population, while the secondary objective included the assessment of the estimated cost of days lost in beds occupied by patients associated with social admissions.

METHODS

Type of study

This was a retrospective cohort study.

Ethics committee evaluation

The protocol and design of this study were approved by the Ethics Committee of the *Centro Hospitalar Universitário de Lisboa Central*, in accordance with the rules established by the General Data Protection Regulation (GDPR) (EU)2016/679 of April 27, 2016. The principal investigator was responsible for processing the information, complying with the principles of data minimisation and anonymisation.

Sample

Sample size

Using the Fleiss formula,[11] for a ratio of 5:1 clinical admissions to social admissions, based on the assessment of the department throughout the previous years – in order to obtain a 90% confidence level and a power of 80%, estimating an odds ratio of 1.50, a minimum group of 548 patients would be required - which, based on previous data, would correspond to the admissions to the department throughout two years.

Patient selection

Patients admitted to the internal medicine department of a tertiary hospital in Lisbon in 2018 and 2019, aged 18 and older, were selected. Patients who have died during hospitalisation or those who were transferred to other wards, other hospitals or were discharged against medical advice were excluded from the study.

Data collection

Data were collected at the time of discharge, and demographic information (age, gender) was collected, as well as the presence of clinical comorbidities - Charlson comorbidity index (CCI) - a comorbidity classification index for the prediction of short- and long-term mortality using a cumulative quantification of the burden of disease from the specific set of secondary diagnoses[12] - arterial hypertension (HTN), type-2 diabetes mellitus (DM), chronic liver disease (CLD), chronic kidney disease (CKD), heart failure (HF), history of acute myocardial infarction (AMI), chronic obstructive pulmonary disease (COPD), history of cerebrovascular disease (CVD), dementia, peptic ulcer, peripheral arterial disease (PAD), connective tissue diseases (CTD) and malignancy. Haemiplegia and human immunodeficiency virus infection were included on the scale although were not broken down in the results - the former because it is a sequela and not a pathology, the latter because of concerns on the part of the Ethics Committee. These diagnoses included previously diagnosed illnesses and pathologies diagnosed

during hospital stays.

Information on hospital stays was also collected, namely the length of stay, clinical discharge, hospital discharge, and referral from palliative care.

Key concepts

These are shown in Table 1.

Statistical analysis

All the analyses were carried out using the Statistical Package for Social Science® software version 26 (IBM® SPSS, Inc, Chicago).

A non-parametric statistical approach was selected due to the characteristics of the sample. Descriptive measures are presented as median and interquartile range (IQR); categorical variables are presented as number and percentage (%). Continuous variables were compared using the Mann-Whitney-Wilcoxon test. The chi-square test (χ^2) or Fisher's exact test were used to compare categorical variables whenever appropriate. Binomial logistic regression was carried out in both groups of patients (those admitted as SA and the remaining patients – SA *vs.* no SA) to assess medical comorbidities as predictors of SA, adjusted for gender, age group and prolonged hospital stay (potential predictors not related to comorbidities - social isolation is more common in elderly patients, particularly female patients, and long hospital stays lead to the patient's loss of autonomy). Binomial logistic regression was carried out on the same groups to assess the Charlson comorbidity index as a predictor of SA, adjusted for gender, age, and prolonged hospital stay.

The data in this study were complete and there was no missing information, so the statistical treatment of missing data did not apply.

All confidence intervals (CIs) were bilateral 95% intervals and the significance level for all tests (*p*-value) was set at 0.05.

RESULTS

Description of patients admitted as SA or no SA

The initial identification included a total of 582 patients. After applying the exclusion criteria (patients who died or were transferred to another hospitals), the remaining patients (473) were considered as a sample, divided into 'SA' and 'No SA' groups (Fig. 1).

Out of 473 eligible patients, 94 (19.87%) were labelled as SA (Fig. 1, Table 2). Female patients were mostly prevalent among these (68%). The total median age of the sample was 78 years, with a statistically significant difference between groups (81 in the SA group, compared to 77 years in the 'no SA' group.

A median length of stay of 4.50 days (IQR 1 - 11) has been found in the SA group, with 91 days as the longest length of stay. A total length of stay of 944 days has been found in the SA group, corresponding to 20.03% of the total length of stay for all the patients in the study.

Prolonged length of stay has occurred in 41% of patients with no SA, with a median length of stay of 7 days, compared to 62% of patients in the SA group (median of 10 days).

Inter-group heterogeneity has been found, with statistically significant differences in factors including gender, age, and the length of stay in prolonged hospital stays, as well as in the percentage of prolonged hospital stays. No statistically significant differences were found as regards medical comorbidities.

Clinical predictors of SA

A binomial logistic regression adjusted for age, gender, and prolonged length of stay (Table 3) was carried out, aimed at assessing the outcomes of the different medical comorbidities on the likelihood of patients being discharged from the hospital. The logistic regression model was statistically significant, $\chi^2(4) = 57.043$, $p < 0.0005$. The model explained 18.0% (Nagelkerke R^2) of the variance in delayed discharge and correctly classified 81.4% of cases. A 13.8% sensitivity and a 98.2% specificity were found, with a 65.0% positive predictive value and an 82.0% negative predictive value. The area under the ROC curve was 0.734 (95% CI, 0.679 to 0.790), which is an acceptable level of discrimination according to Hosmer *et al.*[14] Only three out of the

Table 1 – Key concepts of the study and definition

Concept	Definition
Hospital stay for clinical reasons	Length of stay with clinical justification
Discharge from hospital	End of the clinical reasons for hospital stay
Prolonged length of stay	Length of stay longer than eight days, which has been proposed by the Portuguese Ministry of Health as the average length of stay at an Internal Medicine department of a tertiary hospital[13]
Social admission	Length of stay beyond clinical discharge, with no clinical justification
Length of stay	Total length of stay, including clinical length of stay and SA
Hospital discharge	Discharge from hospital

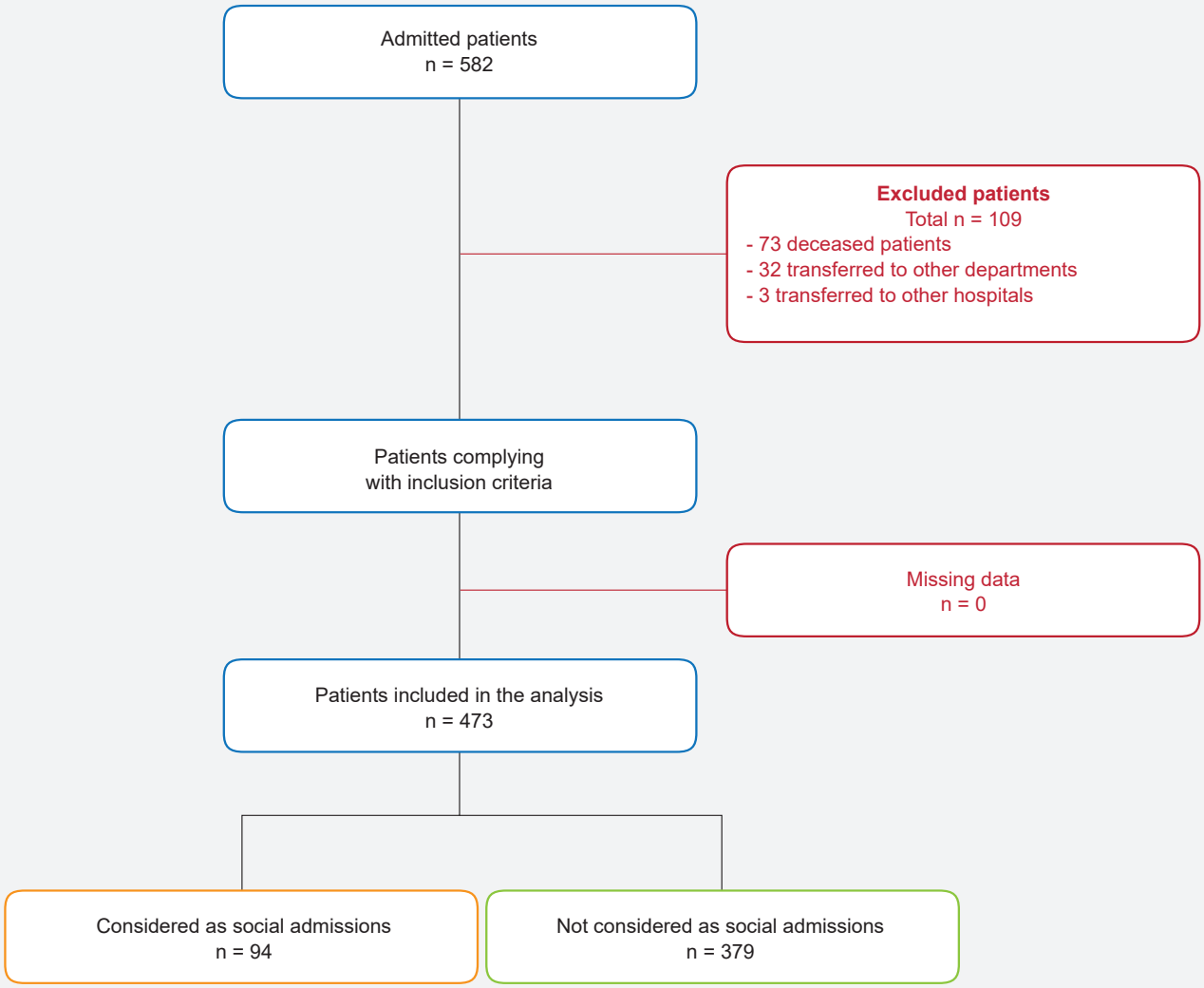

Figure 1 – Data processing and application of inclusion criteria

predictor variables were statistically significant: DM, HF and CKD.

Patients with diabetes were 1.87 times more prone than patients with HF (0.52) or CKD (0.34) to a delayed discharge from hospital.

Binomial logistic regression was also carried out (Table 3), adjusted for age, gender, and prolonged length of stay. The logistic regression model was statistically significant, $\chi^2(4) = 33.463$, $p < 0.0005$. The CCI showed no statistically significant impact.

Economic impact

The study was based on data regarding 2018 and 2019, a period of time not affected by the 2020 pandemic, allowing for the analysis of the economic impact associated with social admissions.[1] Although the reasons for admission were not included in this study, nor were their coding in diagnosis-related groups (DRG), the hospital's 2019 Management Report and Financial Statements allowed to obtain an average of these data, as well as the average length of stay, the latter confirmed by searching the *Serviço Nacional de Saúde* website.[15] Therefore, a 1.33 case mix index - the complexity index based on the hospital production coded in DRGs - for inpatient care at the *Centro Hospitalar Universitário Central de Lisboa* was obtained, in addition to an average length of stay of 7.9 / 8.8 days (depending on the different sources).[16,17] Based on these data, knowing that €2,285 was the single base price for inpatient care in 2019, an average value of €3,039, leading to an estimate of €345 to €384 per day of inpatient care, was obtained.

A total of 994 days were related to SA in this study, meaning that for 994 days beds were occupied with no

Table 2 – Characteristics of our group of patients

General characteristics		Total (n = 473)	Not considered as SA (n = 379)	Considered as SA (n = 94)	*p*-value
Female gender, % (n)		50.9 (241)	**47.2 (179)**	**68.1 (64)**	**< 0.05**
Age, years (IQR)		78 (64 – 85)	**77 (64 – 84)**	**81 (67 – 88)**	**< 0.05**
Age group, % (n)	15 – 29	1.5 (7)	1.8 (7)	0	0.39
	30 – 44	5.3 (25)	5.5 (21)	4.3 (4)	
	45 – 59	12.1 (57)	12.9 (49)	8.5 (8)	
	60 – 74	22.8 (108)	22.7 (86)	23.4 (22)	
	75 – 89	45.7 (216)	45.6 (173)	45.7 (43)	
	> 89	12.7 (60)	11.3 (43)	18.1 (17)	
Lenght of stay, days (IRQ)		8 (5 – 12)	**7 (5 – 11)**	**10 (6 – 15)**	**< 0.05**
Prolonged length of stay (> 8 days), % (n)		31.5 (149)	**41.2 (90)**	**62.8 (59)**	**< 0.05**
Patients in palliative care, % (n)		13.3 (63)	12.1 (46)	18.1 (17)	0.13
Comorbidities					
HTN, % (n)		62.6 (296)	62.5 (237)	62.8 (59)	1.00
DM, % (n)		30.0 (142)	28.2 (107)	37.2 (35)	0.10
HF, % (n)		27.1 (128)	28.5 (108)	21.3 (20)	0.19
Dementia, % (n)		21.6 (102)	20.1 (76)	27.7 (26)	0.12
Malignancy, % (n)		19.2 (91)	19.8 (75)	17.0 (16)	0.66
CVD, % (n)		18.6 (88)	16.9 (64)	25.5 (24)	0.07
COPD, % (n)		15.2 (72)	14.2 (54)	19.1 (18)	0.26
CKD, % (n)		13.3 (63)	14.8 (56)	7.4 (7)	0.06
Previous AMI, % (n)		9.5 (45)	10.0 (38)	7.4 (7)	0.56
CLD, % (n)		8.7 (41)	9.2 (35)	6.4 (6)	0.54
PAD, % (n)		4.7 (22)	4.7 (18)	4.3 (4)	1.00
Peptic ulcer, % (n)		2.7 (13)	2.6 (10)	3.2 (3)	0.73
CTD, % (n)		2.5 (12)	2.4 (9)	3.2 (3)	0.71
CCI, total score (IQR)		5 (4 – 7)	5 (4 – 7)	6 (5 – 7)	0.11

HTN: arterial hypertension; DM: type-2 diabetes mellitus; HF: heart failure; CVD: history of cerebrovascular disease; COPD: chronic obstructive pulmonary disease; CKD: chronic kidney disease; Previous AMI: history of acute myocardial infarction; CLD: chronic liver disease; PAD: peripheral arterial disease; CTD: connective tissue disease; CCI: Charlson Comorbidity Index.

clinical justification. According to the program contract for 2019 and considering the production history and complexity of this hospital, it is estimated that the value associated with this occupation will reach €342,930, which is a significantly undervalued figure. It is also worth mentioning that there are seven wards in the same hospital and that this study only included just one ward throughout different years, so the real cost should be proportionally higher.

DISCUSSION

The main statistically significant characteristics associated with a higher risk of delayed discharge included female gender (OR 2.84, 95% CI 1.65 - 4.90, *p*-value < 0.05), prolonged length of stay (OR 2.64, 95% CI 1.60 - 4.937, *p*-value < 0.05) and diabetes mellitus (OR 1.87, 95% CI 1.08 - 3.23, *p*-value < 0.05). In addition, the presence of heart failure (OR 0.52, 95% CI 0.27 - 0.99, *p*-value < 0.05) and chronic kidney disease (OR 0.34, 95% CI 0.14 - 0.86, *p*-value < 0.05) were associated with a lower risk of delayed discharge.

In addition to entirely social factors, the extension of hospital discharge is affected by different clinical and organisational factors. Even though social factors are those that initially delay the patients returning home or to social support institutions, the state of dependency and the complexity of the clinical conditions may be responsible for the mismatch between the needs of the patients and the ability to adapt to the patients' context and their support network.[18]

A shorter length of stay regarding patients admitted as SA has been found in our group of patients, when compared to literature, with different authors in different contexts describing median lengths of 13 to 16 days.[5,6] The demographic data in our group of patients were in line with the national findings regarding SA; 58% of social admissions regarded female patients and 44% regarded patients older than 80, according to the 2019 *Barómetro de Internamentos Sociais*.[1] The congruence of data is not surprising, given that our sample regarded patients living in the Lisbon and Tagus Valley region, which is the region that contributes the most episodes and days of SA (41% of the national total).[1]

Table 3 – Models (non-adjusted and adjusted) of logistic regression of potential predictors of SA

Geral	Odds ratio for SA (non-adjusted model)	*p*-value	Odds ratio for SA (adjusted model)	*p*-value
Female gender	2.38 (1.48 – 3.84)	< 0.05	**2.84 (1.65 – 4.90)**	**< 0.05**
Age (range)	-	0.55	-	0.89
Prolonged length of stay	2.41 (1.51 – 3.84)	< 0.05	**2.64 (1.60 – 4.37)**	**< 0.05**
Palliative Care	1.60 (0.87 – 2.94)	0.31	1.68 (0.77 – 3.638)	0.19
Comorbidities				
HTN	1.01 (0.63 – 1.61)	0.97	0.80 (0.46 – 1.41)	0.44
DM	1.51 (1.05 – 2.90)	0.09	**1.87 (1.08 – 3.23)**	**< 0.05**
HF	0.68 (0.39 – 1.17)	0.16	**0.52 (0.27 – 0.99)**	**< 0.05**
Dementia	1.52 (0.90 – 2.56)	0.11	1.33 (0.71 – 0.99)	0.38
Malignancy	0.83 (0.46 – 1.50)	0.54	0.85 (0.40 – 1.78)	0.66
CVD	1.69 (0.99 – 2.88)	0.06	1.20 (0.64 – 2.25)	0.58
COPD	1.43 (0.79 – 2.57)	0.24	1.95 (0.99 – 2.8)	0.05
CKD	0.46 (0.20 – 1.05)	0.07	**0.34 (0.14 – 0.86)**	**< 0.05**
Previous AMI	0.72 (0.31 – 1.67)	0.45	0.77 (0.35 – 2.21)	0.78
CLD	0.67 (0.27 – 1.64)	0.38	0.93 (0.34 – 2.49)	0.88
PAD	1.12 (0.37 – 3.40)	0.84	0.98 (0.29 – 3.31)	0.97
Peptic ulcer	1.21 (0.33 – 4.51)	0.77	2.24 (0.54 – 9.35)	0.27
CTD	1.36 (0.36 – 5.11)	0.39	1.56 (0.37 – 6.62)	0.55
CCI	1.05 (0.97 – 1.15)	0.22	1.03 (0.93 – 1.14)	0.57

HTN: arterial hypertension; DM: type-2 diabetes mellitus; HF: heart failure; CVD: history of cerebrovascular disease; COPD: chronic obstructive pulmonary disease; CKD: chronic kidney disease; Previous AMI: history of acute myocardial infarction; CLD: chronic liver disease; PAD: peripheral arterial disease; CTD: connective tissue disease; CCI: Charlson Comorbidity Index; SA: social admission

This reality has also been found internationally. In Brunei, for example, female patients accounted for nearly two thirds of social admissions, even when the samples are younger than those described in Portugal.[19] This can be interpreted by considering issues independent of age, such as the social role of women or the different epidemiology.

However, the justifications for the prevalence of female patients and the higher median age of those exposed to SA can be analysed together. From a cultural point of view and considering the difference in 2019 as regards the average life expectancy in Portugal for men (78.1 years) compared to women (83.7 years), these are more susceptible to widowhood, which means that they have a smaller support structure and less capacity to respond in dependency.[5,20]

The identification of clinical risk factors, defined as the objective of this study, allows for the addition of a component of clinical assessment to the screening and stratification of the need for an early intervention by the Social Services aimed at reducing SA. These relationships have been researched by other authors, leading to conclusions in line with this study. Factors including DM, HTN, obesity, dyslipidaemia and hypoxemic respiratory failure, as well as CHF, with a statistically significant difference compared to the group with no delayed discharge, were found by Husaini *et al.*[19] Dementia, CVD, in addition to patient's age were also described by DM Bai *et al.*[5] Therefore, demographic data related to female patients as well as the presence of DM comorbidity were among the most consistent demographic and clinical findings in literature, with representation in this study.

However, no protective factors of SA, particularly clinical justification, were found by none of the studies; therefore, arguments regarding CKD or HF as protective factors would be speculative. The chronic situation involving greater need for medical monitoring, as well as the proximity of medical care and the need to adapt family dynamics to the patients' context could be part of the answer. On the other hand, the profile of these patients must be considered: these two comorbidities were associated with a combination of more than three comorbidities on average and male patients were mostly affected, as found by Brunner-La Rocca *et al.*[21]

In addition to the demographic characteristics and comorbidities, the length of stay also affects the variation in the patients' dependency and must be considered. In Spain, Giraldo *et al.* have found a median length of stay of 16 days in the population exposed to SA, compared to 7 days in the remaining population.[6] In Brunei, a retrospective study was carried out by Husaini *et al.* involving patients associated with social admissions, and found the same trend towards longer length of stay.[19] In this study, the length of stay was also one of the risk factors of social admission, as patients remained in hospital for more than eight days.

Patients remaining in hospital for a longer time become necessarily out of their routine, increasing their sedentary behaviour and reducing the encouragement for function

and autonomy.[22,23] These findings seem to be independent of the degree of complexity or severity of the diagnosis at admission and its clinical progression.[22,23]

This is also the main justification for the growing need to include the intervention of rehabilitation professionals in the patients' discharge plan, which would have a positive impact on their independence and reducing secondary complications, including falls or delirium.[24,25]

Delaying a hospital discharge has a negative impact not only on patients - at a time of significant vulnerability and exposure to potential reinfections and worsening of their health condition and independence - but also on hospital management, both logistically and economically.[5,26]

According to the 2019 *Barómetro Social*, around 4.7% of admitted patients were in a situation of extended discharge, reaching a national average of 98.4 days of stay. In the same edition, these data allowed for the extrapolation of the costs associated with annual extended discharge to over 83 million euros.[1]

In addition to the costs associated with keeping these patients in hospital, there are also opportunity costs. These reflect the planned activity that is not carried out, which translates into direct costs for patients, whose medical follow-up is postponed, as well as for the hospital, failing to achieve the contracted goals or to ensure best practices.[17]

As regards non-compliance with the contracted service, only 95% of the activity coded with the clinical DRG was carried out, with an even lower percentage regarding the surgical DRG (81.9%).[15] These differences cannot be entirely due to social admissions but should nevertheless be considered.

On the other hand, good clinical practices are also affected, with an inpatient occupancy rate of 89.4% in 2019 (significantly higher than the OECD average of 76%). No agreement has been reached as regards the target occupancy rate defined as good practice[27]; however, a target of 85% has been recommended in 2018 by the National Institute for Health and Care Excellence, which would ensure better patient flow and would enable an adequate response to health crises, allowing patients to be admitted to the place best suited to their needs.[27,28]

The optimisation of the whole process must be a continuous concern, with attention to all the components. An example of the failure of the one-dimensional approach in the UK's NHS was described by Gaughan *et al.*, when assessing the economic relationship between the availability and cost of care homes and the occupation of beds with patients associated with social admissions. The conclusions have confirmed that social admissions responded inversely to an increase in the availability of nursing home beds, although only with moderate effects.[7]

Even though this is not a recent problem (the first articles date back to 1950), the solutions implemented to date have fallen short of what is required, showing that strengthening the support of social services in developed countries only led to a slight reduction in the number of social admissions.[6,8]

It is therefore important looking again at the other reasons related to SA. According to the 2019 *Barómetro de Internamentos Sociais*, 18% of hospital stays were due to families being unable to respond, corresponding to 28% of all days regarding patients associated with social admissions. This represents the second cause of hospital stay, following the availability of the *Rede Nacional de Cuidados Continuados Integrados* - RNCCI, and is the main reason for the total number of days in SA.[1]

The physical and psychosocial needs of patients and caregivers should be assessed as early as possible. This assessment includes a survey of services and equipment to be mobilised and should include the triad of patients, caregivers, and healthcare professionals. To this end, communication with caregivers must be timely and appropriate, ensuring not only the delivery of information, but also the recipient's understanding and the availability of a contact person (in hospital or in the community) for any questions that may arise after discharge.[29] The effectiveness of the communication that enables this survey is a key issue that should not be overlooked.

Miscommunication is recognized as one of the main causes of error in medicine, with some authors finding this in around 70% of errors.[30]

One of the obstacles to discharge resulting from communication deficits relates to the preparation of the entities that will receive the patients, whether informal (family members and caregivers) or formal (social support institutions).[31,32]

A Cochrane review in 2021 showed a slight reduction in hospital stays due to effective discharge planning based on patients' specific needs, although it cannot be said that this means gains in health or associated costs.[3]

Another barrier identified by Okoniewska *et al.* was the need for clarity in the allocation of tasks and responsibilities between team members.[30] The role of discharge management teams is in line with the solutions presented by Okoniewska *et al.* who have recommended daily meetings specifically dedicated to preparing for discharge, in addition to an effective and proactive discharge plan. Six questions should be answered: the expected length of stay of each patient; which patients will be discharged immediately and what the constraints are; where the patients will go; what the medical plan is for the day; what the medical needs are for discharge and what follow-up the patient will have.[30] In this way, and thanks to the comprehensive view provided by current literature, we realize that this is indeed a complex

problem, with a necessarily multidimensional approach.

Although this study provides a framework and contextual survey of the data regarding patients admitted as SA, its limitations must be borne in mind. Bias can exist in the form of underreporting of specific pathologies that tend to be underdiagnosed, especially in the elderly population, including dementia - ignoring relevant potential risk factors.

In addition, the pathologies were classified on a binary basis, without quantifying their severity. The selection bias may have occurred because of the retrospective analysis of a convenience sample, carried out on a database that was not originally designed to answer this specific research question, omitting social and economic data that, following a similar methodology, could reinforce the design of the socio-clinical/economic profile of the patients who would benefit from an early intervention. Despite the adequate sample size, the assessment of different pathologies makes this estimate more inaccurate.

Based on the limitations and lessons learned from this study, and given that literature comes from different contexts in terms of demographics, epidemiology, social structures and healthcare systems, a further multicentric project and the prospective collection of demographic, clinical and social data are presented by the authors, addressing the same objective and allowing the creation of a clinical prediction rule, similar to the one carried out by Bai *et al.*, and adapted to the Portuguese reality.[5]

CONCLUSION

Female gender, prolonged length of stay and diabetes mellitus were associated with a higher risk of SA, while the presence of heart failure and chronic kidney disease were associated with a lower risk of SA.

The conclusions of this study lay the foundations for the development of a system for the assessment of patients at risk of delayed discharge, enabling an early intervention and a reduction in financial costs, with a vision based on creating value for the patients and allowing for a more individualised and higher quality approach to discharge.

AUTHOR CONTRIBUTION

MM: Study design, data collection, writing of the manuscript, statistical analysis, result discussion.

AM, FM, MN, MS: Data collection, content revision, result discussion, final approval.

DC: Study design, literature review, content revision, result discussion, final approval.

HL: Study design, content revision, final approval.

HUMAN AND ANIMAL PROTECTION

The authors declare that this project complied with the regulations that were established by the Ethics and Clinical Research Committee, according to the 2013 update of the Helsinki Declaration of the World Medical Association.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

DATA CONFIDENTIALITY

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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