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ORIGINAL ARTICLE

Comprehensive geriatric assessment of older patients and associated factors of admission to Emergency Departments in pre-covid 19 Era – A Portuguese study



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ABSTRACT

Objectives: Identifying frequent users' (≥ 3 admissions/year) associated factors in an emergency department (ED), using a comprehensive geriatric assessment (CGA), describing the characteristics of patients over 65 years of age.

Methods: A cross-sectional study was performed between August 2017 and June 2018 in an ED in Lisbon, Portugal. CGA was applied and completed with clinical records. Clinical, functional, mental and social scores were created based in Portuguese Society of Internal Medicine, and a statistical model was developed.

Results: CGA was applied to 426 patients over 64 years old in an ED. The mean age was 79.3, 84.7% had multimorbidity. 51.2%, 75.6%, and 40% had dependence on basic, instrumental, and walking activities, respectively. 52% had depressive symptoms, 65.7% had cognitive impairment, 63% were undernourished/at risk for malnutrition. 33.1% were socially at risk. Polypharmacy was present with a use on average of 6.5 drugs daily. Social, clinical, functional, and mental scores were unfavourable in 48.6%, 79.6%, 54.9% and 83.1% of the population, respectively. There were 2.7 hospital admissions/year and 39.9% were frequent ED users (≥ 3 /year). The logistic regression model was weak, but showed that patients with polypharmacy, elevated Charlson Comorbidity index and an impairment nutritional status presented higher risk of being frequent users.

Conclusions: This study showed that 97.1% of patients had needs that would justify an interventional care plan. This intervention should be extended to primary care and nursing homes. While not providing a robust model, our study has indicated nutritional problems, polypharmacy, and an elevated Charlson index as the features with more weight in frequent users' admissions.

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Valoración geriátrica integral de pacientes mayores y factores asociados de frecuentación en servicios de urgencias en la era pre-COVID-19 – Un estudio portugués

R E S U M E N

Palabras clave:

Usuarios frecuentes
Valoración geriátrica integral
Departamento de emergencia
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Evaluación funcional

Objetivos: Identificar factores asociados con usuarios frequentadores (≥ 3 ingresos/año) en un departamento de urgencias (DU), mediante valoración geriátrica integral (VGI) y describir las características de los pacientes mayores de 65 años que acuden a urgencias.

Métodos: El estudio transversal se realizó entre agosto del 2017 y junio del 2018 en un DU de Lisboa, Portugal. Se realizó una VGI además de la historia clínica. Se crearon *scores* clínicos, funcionales, mentales, sociales, basándose en el protocolo de cuestionario del grupo de geriatría de la Sociedad Portuguesa de Medicina Interna y se desarrolló un modelo estadístico para identificar los factores asociados con la alta frecuentación.

Resultados: Se realizó una VGI a 426 usuarios mayores de un DU. La edad media fue de 79,3 años, siendo 53,8% mujeres con un 84,7% de multimorbilidad, 51,2% de dependencia de las actividades básicas (Katz), 75,6% instrumentales (Lawton < 5 en mujeres, < 3 hombres y 40% de dependencia de la marcha (Holden). El 52% tenían síntomas depresivos (Yesavage), 65,7% tenían deterioro cognitivo (MMSE < 24), 63% estaban desnutridos/en riesgo de desnutrición (MNA $< 23,5$). El 33,1% estaba en riesgo social (Gijón, APGAR familiar). La polifarmacia con el uso de un promedio de 6,5 medicamentos al día. Los *scores* sociales, clínicos, funcionales y mentales fueron adversos en el 48,6, 79,6, 54,9 y 83,1%, respectivamente. Hubo 2,7 admisiones/año y el 39,9% eran usuarios frecuentes de DU (≥ 3 /año). Un modelo de regresión logística fue débil, pero mostró que los pacientes con polifarmacia, índice de comorbilidad de Charlson elevado y un estado nutricional adverso presentaban mayor riesgo de ser usuarios frecuentes.

Conclusiones: El 97,1% de los pacientes tenían necesidades que justificarían un plan de intervención específico. Si bien no proporciona un modelo sólido, nuestro estudio ha indicado problemas nutricionales, polifarmacia y un índice de Charlson elevado, como las características que se asocian con ser frequentador del Servicio de Urgencias.

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Introduction

In the last 30 years, Portugal has become more aged; approximately 21.8% of the population is older than 65 and 13.7% are under 18.¹ Currently, there is a great amount of evidence assessing different models of Geriatric Care, showing that this health care models are better than traditional care across many settings, but there is a lack of evidence on which is the most effective in providing care for older people. This population has a higher rate of use of the emergency departments (ED) than any other population, and as they grow older, their ED use increases by 30%.² Many studies have suggested that having been treated in the ED, older individuals continue to have unresolved needs, with 80% being discharged with at least one unresolved health problem, mainly due to non-specific clinical problems.³ Some studies have applied a comprehensive geriatric assessment (CGA) in ED settings and implemented strategies to reduce readmissions.³ CGA is a multi-dimensional diagnostic and therapeutic process and includes clinical, functional, social, and mental assessments of the patient as a whole. Studies using this comprehensive method to assess and plan treatment have generated reliable and favourable results.^{3,4} Therefore, in this context, this study aims to identify frequent users associated factors in this population, using CGA. To do so CGA was applied with the clinical, functional, mental, and social evaluations and the respective variables were grouped into scores (clinical, functional, mental, and social score). A clinical record was used to retrospectively see how many times each patient had been in the ED in the previous 12 months. Patients with three or more admissions/year to the ED were considered frequent users. Secondary objectives are to describe the characteristics of the population who attend the emergency room over 64 years of age, the characteristics of frequent users, and to check if frequent users had more hospital admissions.⁵

Methods

Study design

A observational, cross-sectional, single-centre study was performed in the ED of a tertiary hospital in Lisbon, Portugal, between August 2017 and June 2018.

Sample size

Assuming a population of 18,638 senior individuals seen in the hospital ED over a four-month period (October 2017 to January 2018), a minimum sample size of 377 patients was estimated (Appendix Fig. 1), considering 95% confidence intervals (CI), a 5% error margin and a prevalence of frequent users of 50%. A 10% margin accounted for non-responses or incomplete questionnaires. Our final sample had 426 patients.

Study sample and procedures

A representative convenience sample was used, stratified by sex, age, day of the week, time of admission, and Manchester triage colour. To do so, between August 2017 and June 2018, each day, in each shift (morning, afternoon and night, depending on the availability of researchers), between 1 and 3 patients were randomly chosen from all the patients present in the ED and the CGA was applied, regardless of the general situation of the patient. Inclusion criteria were patients over 64 years old admitted to the ED, able to answer questions or with able family members. Exclusion criteria were blue or red Manchester triage colour. The exclusion of these triage colours was because they were unable to answer or had no urgency criteria. The Manchester Triage System enables nurses to assign a clinical priority to patients, based on presenting signs and

symptoms. The research protocol included a questionnaire which was completed through an interview, during the ED stay. Informed consent was requested and obtained. Each patient, or relative if the patient was not cooperative, was asked to complete the questionnaire. The questionnaire was conducted by a member of the team. The team included a doctor, an emergency room nurse, and a social worker. The doctor had experience in multidimensional evaluation interviews and was responsible for team training and standardising evaluation procedures between interviewers to increase reliability. The average time of the interview was 25–30 min. Subsequently, the clinical records were reviewed to complete epidemiologic and clinical information, and to see how many times each patient had been in the ED in the previous 12 months.

Measures

The research protocol included the epidemiological and clinical characterisation of the patient, the questionnaires of the Geriatric Group of the Portuguese Internal Medicine Society (GERMI)⁶ and of the Emergency Social Department of the hospital where the study was performed, after which the patient's needs and interventions were concluded. The research protocol included the following translated and validated questionnaires to assess four main domains: 1. Functionality – the Katz index of independence in activities of daily living⁷ to measure the independence in basic daily activities, The Lawton and Brody scale⁸ to measure independence in instrumental activities, Holden's gait scale^{6,9} to measure independent gait. The Katz Index assess six basic activities of daily Life (BADLs): bathing, dressing, toileting, transferring, continence, and feeding. For each activity, the person is classified as dependent (score 0) or independent (score 1). The final score results from the sum of the six activities scores and varies between 0 (dependent) to 6 points (independent), the score corresponding to the number of BADLs in which the older person is independent: total dependence (0), severe dependence (1–2), moderate dependence (3–4), low dependence (5), independent (6). In this study, this variable was dichotomized as independent (a score of 6 points = 0) or dependent (scores from 0 to 5 = 1). The Lawton Index assesses eight instrumental activities of daily living (IADL). For each one, the older person is classified as Dependent (0 points) or Independent (1 point). The final score varies between 0 and 8 points (5 points in men). The following categories were considered in this study. "0 = independent to light dependent" (for scores between 6–8 in females and 5–4 in males) and "1 = moderate to totally dependent" (for scores between 0–5 in females and 0–3 in males). In the Holden's Gait Scale, according to GERMI, six categories are established, trying to classify the older person in the category that most closely matches their ability to walk; 2. Mental Health – geriatric depression scale (GDS-15)¹⁰ and the mini-mental state examination (MMSE)^{11,12,13} to measure depressive and cognitive symptoms. The 15-item Geriatric Depression Scale (GDS) was used to measure depression in the older. The total score ranges between 0 and 15 points. A cut-off of 5 indicates presence of depressive symptoms and was used in the current work. The Portuguese normative values were used in MMSE, with the following interpretation to possible cognitive decline if MMSE \leq 22 for subjects from 0 to 2 years of education, \leq 24 for subjects with 3–6 years of education and \leq 27 for those with \geq 7 years of education; 3. Nutrition – mini-nutritional assessment (MNA)¹⁴ to measure nutritional status. The MNA is a validated instrument developed to assess nutritional status. The maximum score in the MNA test is 30 points. Subjects could be classified into three groups: score 30–24 (normal nutritional status), 23.5–17 (at risk for malnutrition) and less than 17 (malnutrition). This classification was recodified as: 0 = normal (scores between 30 and 24) and 1 = undernourished or at risk for malnutrition (scores less than 23.5). In this study, the full MNA form

translated into Portuguese language provided by Nestlé's Nutrition Institute was applied; and 4. Social – The GIJON scale^{15,16} the family APGAR scale,¹⁷ (The acronym APGAR has been applied to the functional components of Adaptability, Partnership, Growth, Affection, and Resolve)¹⁷ and the GRAFFAR test^{18,19} to measure social needs.

Variables and descriptive statistics

The epidemiological, clinical, functional, mental, and social variables collected are presented in [Appendix: Table 1](#). The dependent variable is frequent users (<3 admission/year = 0; \geq 3 admissions/year = 1). Some variables were transformed to binary: if the variable had a positive behaviour for the patient represented an advantage²⁰; if the variable represented an unfavourable behaviour it was considered a disadvantage.^{21–23} Each group of variables generated scores that were scored according to the number of advantageous or disadvantageous variables. Thus, for the clinical score (<2 advantage; \geq 2 disadvantage; min = 0; max = 4) were considered the Charlton Comorbidity index (Low risk = 0; Intermediate to high risk = 1), multimorbidity (\leq 2 chronic health conditions = 0; $>$ 2 chronic health conditions = 1), polypharmacy (< 4 current medications = 0; \geq 4 current medications = 1), and the Mini-nutritional assessment (Normal = 0; undernourished or malnutrition risk = 1); for the mental score (< 1 advantage; \geq 1 disadvantage; min = 0; max = 2) were considered the Geriatric Depression Scale (without depression = 0; with mild depression, severe depression = 1) and Mini-mental State Examination (without dementia = 0; with dementia = 1); for the functional score (< 2 advantage; \geq 2 disadvantage; min = 0; max = 3) the Katz Scale (independent with 6 points = 0; dependent from 0 to 5 = 1), Lawton and Brody Scale (independent, light dependent = 0; moderate dependence, severe dependence, totally dependent = 1), and Holden's Gait Scale (independent walking = 0; all type of dependent walking = 1) were considered; and for the social score (< 2 advantage; \geq 2 disadvantage; min = 0; max = 3) the GIJON scale (without risk = 0; social risk or social problem = 1), the Family APGAR scale (without disfunction = 0; family dysfunction or no family = 1), and the GRAFFAR test (upper and upper middle class = 0; lower middle class and working class = 1) were considered. The minimum score was zero if all variables were favourable. We considered that the score would be unfavourable if half of the score variables were unfavourable.²⁰ We consider Multimorbidity as having more than two chronic health conditions²³ and polypharmacy as taking five or more current medications.²⁴ It was not an objective to analyse hospital admissions resulting from ED admissions.

Inference statistics

After descriptive statistics, a subgroup of frequent user patients (main dependent variable) was analysed to evaluate the association of each variable in frequent user status. We considered a frequent user as a patient with three or more admissions/year to the ED.⁵ Chi-square tests (χ^2 tests) of independence and crude odds ratios (OR) were sequentially used. Statistically significant variables were included in the final multivariable model ($p \leq 0.05$). To measure the model's discrimination, the forward likelihood method and the area under the receiver operating characteristic curve (ROC) were used.²⁵ For statistical analyses, SPSS software version 24.0 was used and a statistical significance level of 5% was adopted.²⁶

Ethical considerations

This study was conducted in full accordance with the World Medical Association Declaration of Helsinki and was approved by the Portuguese National Data Protection Commission and the hospital's Ethics Committee. Written consent was obtained from all

patients and/or family members. All data were anonymised with a code number.

Results

Of 33,807 ED patients admitted between August 2017 and June 2018, 428 were recruited to this study. Two refused to participate. A CGA was performed on 426 patients during their stay in the ED. In terms of descriptive statistics (Table 1), over half were women (53.8%), with a mean age of 79.3 years (SD = 7.92; minimum age = 65, maximum age = 101, median age = 79), and most in the 75–84 age group. In the sample 84.7% had multimorbidity (SD = 2.3; min = 0; max = 15; median = 5) and an average of 6.5 different drugs taken daily (SD = 3.8; min = 0, max = 19, median = 6). The clinical scores were unfavourable in 79.6%, with 84.7% of patients having multimorbidity, 66.9% with polypharmacy and 63% being undernourished or at risk for malnutrition. The functional score was unfavourable in 54.9%, considering that 51.2% had some degree of dependence on basic activities of daily living, and 75.6% had some dependence on instrumental activities of daily living. For the mental score, 83.1% was unfavourable, with 52.8% of patients with depressive symptoms and 65.7% with cognitive impairment. In terms of social assessment, the social score was unfavourable for 48.6%, with 33.1% at social risk. There was on average 2.7 (SD = 2.9) visits/year to the ED (min = 0; max = 21, median = 2), however, 39.9% had three or more visits in the last year in the hospital record (frequent users). Most of these patients would require a complete intervention care plan, with a focus on social, mental, functional, or nutritional interventions. Only twelve patients (2.8%) did not have an unfavourable evaluation. The other 414 (97.2%) needed counselling about the intervention plan that they should adhere to, to better their health. This consisted in medication adjustment, nutritional and exercise counselling, or specialised appointments. Considering these results, comparing the group of non-frequent users and frequent users, we could say that the typical non-frequent users attending the ED in our sample was a female, aged 75–84 years, living in the city, at home with someone of the same age (Table 1). This patient has a family doctor, multimorbidities, polypharmacy, takes care of her own medication, and presents some dependence in daily living activities, depressive symptoms, some cognitive impairment, and malnutrition risks. She has a primary education and belongs to a low social class. The typical frequent user (Table 2; Appendix Table 2), is somewhat different: male, 85 years old or older, living in a rural area, institutionalised, or living with their family, without a family doctor and with some dependence, cognitive impairment, and social risks. Nevertheless, as with the non-frequent users, these usually have multimorbidity ($p = 0.04$), polypharmacy ($p = 0.00$), a moderate to high comorbidity index ($p = 0.00$) with depressive symptoms ($p = 0.05$) and are undernourished/at risk for malnutrition ($p = 0.00$). Half of the frequent users needed to be transferred to wards, but this was not statistically significant ($p = 0.06$). The most important factors to be a frequent user were (Table 3) a high Charlson comorbidity index (OR = 2.39; 95%CI 1.715; 3.333; $p = 0.00$), multimorbidity (OR = 1.899; 95%CI 1.061; 3.399; $p = 0.03$), polypharmacy (OR = 2.338; 95%CI 1.508; 3.627; $p = 0.00$), dependency on basic activities of daily living (OR = 1.483; 95%CI 1.003; 2.191; $p = 0.048$), dependent walking (OR = 1.486; 95%CI 1.001; 2.205; $p = 0.049$), undernourished or at risk of malnutrition (OR = 1.972; 95%CI 1.299; 2.993; $p = 0.001$), social risk (OR = 1.532; 95%CI 1.017; 2.306; $p = 0.041$) and having a family dysfunction (OR = 1.662; 95%CI 1.091; 2.532; $p = 0.028$). Also, clinical (OR = 3.387; 95%CI 1.913; 5.998; $p = 0.00$) and social (OR = 1.504; 95%CI 1.019; 2.222; $p = 0.040$) scores were statistically significant. These variables, except clinical and social scores, were used to build

a logistic regression model (Table 4) to determine which variables most contributed to ED use. The models revealed a low discriminative power (area under the curve (AUC) = 0.655; 95%CI; 0.60; 0.70). Nevertheless, based on this model, patients with polypharmacy (OR = 2.338; 95% CI 1.618; 3.380; $p = 0.000$), an unfavourable nutritional status (OR = 1.972; 95% CI 1.389; 2.799; $p = 0.001$) and a high Charlson Comorbidity index (OR = 2.39; 95% CI 1.715; 3.333; $p = 0.008$) presented two-fold higher odds of being frequent users of the ED. These data highlighted the importance of individual nutritional status in this context.

Discussion

This is the first Portuguese study to use CGA in an ED setting, investigating a representative sample from the biggest hospital in Lisbon. Functionality and social problems were as important as clinical and mental issues, and part of a holistic evaluation. This study showed that 97.2% of patients had needs that would justify an interventional care plan and that their overall requests could not be addressed by the ED. A more complete evaluation of the ED role in society is urgently required. The absence of geriatric training in Portuguese medical schools or geriatric specialties makes it extremely difficult to adequately identify these needs. Non-frequent and frequent users of the ED had some common features that were statistically significant, but other characteristics were quite different, which warrants further study. The associated factors for ED admission, as determined by the logistic regression model, were nutritional problems, polypharmacy and an elevated Charlson index. The difficulty in defining ED visit associated factors has been highlighted by Wallace et al.⁴ These authors identified 13 models that attempted to predict ED admissions in older individuals. Our study was very comprehensive as it included most of the variables from these models. The models using subjective variables, like those present in social and functional inquiries, were weaker. The variables of the 13 models considered in the Wallace review included our predictor variables: the Charlson index and polypharmacy, but none of these models included nutritional evaluations. In older individuals, nutritional problems are relevant because they reveal social, economic, or health problems. Similarly, nutritional problems may be associated with less muscle mass, less strength, frailty, and functional decline, all potentially characteristic of disease or susceptibility to disease.²⁷

In considering other variables in our study, we observed that most of the patients had a primary care doctor, yet 40% were frequent ED users. Why does this happen? Of the patients that lived in nursing homes, 40% were frequent ED users. Nursing homes should facilitate other healthcare solutions, and similarly, being institutionalised should not be a risk factor for ED admission.²⁸ Also, there could be accessibility differences/issues in ED admissions for older patients living alone vs. those who live with family members, since the latter group was the most frequent users.

This study has some limitations: it was a cross-sectional design and was limited to one ED only; Two of the scales were translated but not validated for Portuguese populations; The use of MMSE in ED can be controversial because of acute disease; Consequently, our results may not be generalised to broader populations. However, despite these limitations, this study contributes a first Portuguese in-depth characterisation and understanding of older patients using the ED. In other developed countries, a variety of ED projects³ or community initiatives to reduce ED admissions are being rolled out, in consultation with geriatric doctors and employing CGA approaches. Multidimensional evaluations are necessary to provide accurate scenarios, highlighting the need for medical geriatric training and health and social services integration. Patient centred programmes should be implemented, as well as the inte-

Table 1
Global characterisation of patients (descriptive statistics).

Variables	n; %
Sex	
Female	229; 53.8%
Age	
65–74	131; 30.8%
75–84	179; 42.0%
Over 85	116; 27.2%
Do you have a family physician?	
Yes	353; 82.9%
Living environment	
Urban/rural	346; 81.2%/80; 18.8%
Place of living	
Home/nursing home	384; 90.1%/42; 9.9%
Who do you live with?	
Younger family	99; 23.2%
Family of the same age	173; 40.6%
Nursing home	42; 9.9%
Alone	112; 26.3%
Education level	
Illiterate	72; 16.9%
Primary education	237; 55.6%
Lower secondary education	80; 18.7%
Upper secondary education	12; 2.8%
Tertiary education or higher	25; 5.9%
Number of active medical problems (average)	5
Multimorbidity	
≤2/>2 chronic health conditions	65; 15.3%/361; 84.7%
Charlson Comorbidity index	5
Charlson Comorbidity index	
Low risk/intermediate to high risk	240; 56.3%/186; 43.7%
Polypharmacy	
<4/≥4 concurrent medications	141; 33.1%/285; 66.9%
Number of different daily medicines (average)	6.5
Number of ED admissions during 2017 (average)	2
Admission to ward/discharge	
Discharge/admission to ward	301; 70.7%/125; 29.3%
Frequent users	
<3/≥3 visits to ED	256; 60.1%/170; 39.9%
Katz Index of Independence in Activities of Daily Living	
Total independence/low, moderate, severe, total dependence;	208; 48.8%/218; 51.2%
Lawton & Brody instrumental activities of daily living scale	
Independent and low dependence/moderate, severe, total dependence	191; 44.8%/235; 55.2%
Holden's Gait Scale	
Independent walking/all types of dependent walking	160; 22.3%/266; 77.7%
Geriatric Depression Scale	
No depression	205; 48.1%
Mild or severe depression	221; 51.8%
Mini-Mental State Examination	
No cognitive impairment	146; 34.2%
Cognitive impairment	280; 65.7%
Mini-nutritional assessment	
Normal/undernourished or malnutrition risk	157; 36.9%/269; 63.1%
Body mass index (average)	25.7
GIJON scale	
No social risk/with social risk	285; 66.9%/141; 33.1%
Family APGAR scale	
No dysfunction	181; 42.5%
Family dysfunction	193; 45.3%
No family	52; 12.2%
GRAFFAR test	
Upper, middle-upper, middle class	153; 35.9%
Middle-lower and lower class	273; 64.1%

Table 1 (Continued)

Variables	n; %
<i>Social score</i>	
Advantage/disadvantage	219; 51.4%/207; 48.6%
<i>Clinical score</i>	
Advantage/disadvantage	87; 20.4%/339; 79.6%
<i>Functional score</i>	
Advantage/disadvantage	192; 45.1%/234; 54.9%
<i>Mental score</i>	
Advantage	72; 16.9%
Disadvantage	354; 83.1%

If the variable had a positive behaviour for the patient represented an advantage²⁰; if the variable represented an unfavourable behaviour it was considered a disadvantage; the Katz index of independence in activities of daily living total dependence (0), severe dependence (1–2), moderate dependence (3–4), low dependence (5), independent (6); The Lawton and Brody scale 0 = independent to light dependent” (for scores between 6–8 in females and 5–4 in males) and “1 = moderate to totally dependent” (for scores between 0–5 in females and 0–3 in males); Holden’s gait scale, six categories are established, trying to classify the older person in the category that most closely matches their ability to walk; geriatric depression scale (GDS-15) The total score ranges between 0 and 15 points. A cut-off of 5 indicates presence of depressive symptoms and was used in the current work; the mini-mental state examination (MMSE) MMSE \leq 22 for subjects from 0 to 2 years of education, \leq 24 for subjects with 3–6 years of education and \leq 27 for those with \geq 7 years of education; Mini-nutritional assessment (MNA), score 30–24 (normal nutritional status), 23.5–17 (at risk for malnutrition) and less than 17 (malnutrition). This classification was recodified as: 0 = normal (scores between 30 to 24) and 1 = undernourished or at risk for malnutrition (scores less than 23.5); The GIJON scale; the family APGAR scale; the GRAFFAR test.

Table 2

Differences in clinical, functional, mental, and social characteristics between frequent and non-frequent users. Statistically significant variables.

Variables	Values allowed	ED frequent users		<i>p</i> \leq 0.05
		No	Yes	
Age	65–74	90 (68.7%)	41 (31.3%)	0.05
	75–84	101 (56.4%)	78 (43.6%)	
	Over 85	65 (56.0%)	51 (44.0%)	
Multimorbidity	\leq 2 chronic health conditions	47 (72.3%)	18 (27.7%)	0.04
	$>$ 2 chronic health conditions	209 (57.9%)	152 (42.1%)	
Charlson Comorbidity index	Low risk	90 (48.4%)	96 (51.6%)	0.00
	Intermediate or high risk	166 (69.2%)	74 (30.8%)	
Polypharmacy	$<$ 4 current medication	103 (73.0%)	38 (27.0%)	0.00
	\geq 4 current medication	153 (53.7%)	132 (46.3%)	
Geriatric Depression Scale	No depression	121 (59.1%)	84 (40.9%)	0.05
	Mild or severe depression	135 (61.1%)	86 (38.9%)	
Mini-nutritional Assessment	Normal	110 (70.1%)	47 (29.9%)	0.00
	Malnutrition risk or undernourished	146 (54.3%)	123 (45.7%)	
GIJON scale	No social risk	181 (63.5%)	104 (36.5%)	0.05
	Social risk	75 (53.2%)	66 (46.8%)	
Family APGAR scale	No dysfunction	122(67.4%)	59 (32.6%)	0.02
	Family dysfunction	107 (55.4%)	86 (44.6%)	
	No family	27 (51.9%)	25 (48.1%)	
Social score	Advantage	142 (64.8%)	77 (35.2%)	0.05
	Disadvantage	114 (55.1%)	93 (44.9%)	
Clinical score	Advantage	70 (80.5%)	17 (19.5%)	0.00
	Disadvantage	186 (54.9%)	153 (45.1%)	

Table 3

Statistically significant variables to be a frequent user.

Variable	OR	Odds ratios		<i>p</i> values
		CI 95%		
		Lower	Upper	
Age	1.695	1.056	2.720	0.05
Multimorbidity	1.899	1.061	3.399	0.03
Charlson Comorbidity index	2.39	1.715	3.333	0.00
Polypharmacy	2.338	1.508	3.627	0.00
Katz Index of Independence in Activities of Daily Living	1.483	1.003	2.191	0.04
Holden Functional Ambulation Category	1.486	1.001	2.205	0.04
Geriatric Depression Scale	1.179	0.755	1.842	0.05
Mini-nutritional Assessment	1.972	1.299	2.993	0.00
Gijón scale	1.532	1.017	2.306	0.04
Family APGAR scale	1.662	1.091	2.532	0.02
Clinical score	3.387	1.913	5.998	0.00
Social score	1.504	1.019	2.222	0.04

OR, odds ratios; CI, confidence interval.

Table 4
Statistically significant variables to regression model and ROC curve.

Regression model	Adjusted OR			
	OR	CI 95%		p value
		Lower	Upper	
Charlson Comorbidity index	2.393	1.715	3.333	0.008
Polypharmacy	2.338	1.618	3.380	0.000
Mini-nutritional assessment	1.972	1.389	2.799	0.001

OR, odds ratios; CI, confidence interval.

gration of care services to provide continuity of chronic care in this population.

Conclusions

This study showed that 97.2% of older patients attending the ED had needs that would justify an interventional care plan. This intervention should be extended to primary care and nursing homes to potentially mitigate the 40% of frequent ED users. While not providing a robust model, our study has indicated some potential associated factors for ED visits and the inadequacy of a one-size-fits-all answer for these patients. Nutritional problems, polypharmacy, and a high Charlson index were the features with more weight for frequent users. Future studies should facilitate proper robust interventions to fully investigate patient needs and allow a more complete answer to their needs.

Conflicts of interest

All authors disclose no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi: 10.1016/j.regg.2022.08.005](https://doi.org/10.1016/j.regg.2022.08.005).

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