Original article

Influence of type of household on prognosis at one year in patients ≥65 years attending hospital emergency departments in Spain. The EDEN-6 study

Aitor Alquézar-Arbé [a],[*],[1], Gina I. Osorio [b],[1], Javier Jacob [c], Eric Jorge García-Lamberechts [d], Pascual Piñera Salmerón [e], Pere Llorens [f], Guillermo Burillo-Putze [g], Angela Cobos Requena [h], Adriana Gil [f], Cesáreo Fernández [d], Sira Aguiló [b], Sònia Jiménez [b], Beatriz Escudero Blázquez [d], Diana Rosendo Mesino [i], Enrique Martín Mojarro [j], Aarati Vaswani-Bulchand [k], Montserrat Rodríguez-Cabrera [l], Pedro Alarcón Martínez [e], Gema Dominguez Gioya [m], Francesc Xavier Alemany González [b], Matilde González Tejera [n], María Bóveda García [o], Begoña Espinosa Fernández [f], Ferran Llopis [c], Coral Suero Méndez [p], Juan González del Castillo [d], Òscar Miró [b], on behalf of SIESTA network[2]

[a] Emergency Department, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain
[b] Área de Urgencias, Hospital Clínic, IDIBAPS, University of Barcelona, Barcelona, Spain
[c] Emergency Department, Hospital Universitari de Bellvitge, l'Hospitalet de Llobregat, Barcelona, Spain
[d] Emergency Department, Hospital Clínico San Carlos, IDISSC, Complutense University, Madrid, Spain
[e] Emergency Department, Hospital General Universitario Reina Sofía, Murcia, Spain
[f] Emergency Department, Dr. Balmis General University Hospital, Alicante Institute for Health and Biomedical Research (ISABIAL), Alicante, Spain
[g] Facultad de Ciencias de la Salud, Universidad Europea de Canarias, Tenerife, Spain
[h] Emergency Department, Hospital Reina Sofía, Córdoba, Spain
[i] Emergency Department, Hospital Universitario Infanta Cristina, Madrid, Spain
[j] Emergency Department, Hospital Santa Tecla, Tarragona, Spain
[k] Emergency Department, Hospital Universitario de Canarias, Tenerife, Spain
[l] Emergency Department, Hospital Norte Tenerife, Spain
[m] Emergency Department, Hospital Universitario del Henares, Madrid, Spain
[n] Emergency Department, Hospital General Universitario de Elche, Spain
[o] Emergency Department, Hospital Universitario y Politécnico La Fe, Valencia, Spain
[p] Emergency Department, Hospital de la Axarquia de Velez-Malaga, Spain

A R T I C L E   I N F O

A B S T R A C T

Objective: To investigate whether the type of household is associated with prognosis at one year in patients ≥65 years of age discharged after medical consultation requiring emergency department care.
Methods: Data from the Emergency Department and Elder Needs (EDEN) cohort were used. This retrospective cohort included all patients ≥65 years of age seen in 52 Spanish emergency departments over one week (April 1–7, 2019) in whom the type of household was recorded and categorized as living at home alone, with relatives, with professional caregivers, or in a nursing home. Patient demographic and other baseline characteristics and management during the index emergency department episode were recorded and used to adjust the following 1-year outcomes: all-cause mortality, hospitalization and emergency department revisit. Associations between type of household and outcomes are expressed as adjusted hazard ratios with 95% confidence intervals using living alone as the reference category.

* Corresponding author at: Servei d'Urgències, Hospital de la Santa Creu i Sant Pau, Carrer de Sant Quintí 89, CP 08041 Barcelona, Spain.
E-mail addresses: aalquezar@santpau.cat (A. Alquézar-Arbé), GOsorio@clinic.cat (G.I. Osorio), jjacob@bellvitgehospital.cat (J. Jacob), llorens_ped@gva.es (P. Llorens), Saguilo@clinic.cat (S. Aguiló), SJimenez@clinic.cat (S. Jiménez), falemany@clinic.cat (F.X. Alemany González), boveda_mar@gva.es (M. Bóveda García), fllopis@bellvitgehospital.cat (F. Llopis), omiro@clinic.cat (Ò. Miró).
[1] Both authors equally contributed to this work and should be considered as first author.
[2] The collaborators of the SIESTA group are listed in Appendix A.

Results: 13,442 patients with a median age of 79 years (interquartile range 72–86) were included; 56% were women, 12.2% of patients lived alone, 74.9% with relatives, 3.9% with a professional caregiver, and 9.1% in a nursing home. During the year following discharge, the mortality rate was 14.0%, the hospitalization rate 29.7%, and the emergency department revisit rate 59.3%. In the fully adjusted model, the risk of death was associated only with living in a nursing home (hazard ratio 1.366 (1.101–1.695)). On the other hand, the risk of hospitalization was lower in individuals living in nursing homes (hazard ratio 0.783 [0.676–0.907]) and at home with relatives (hazard ratio 0.897 [0.810–0.992]), while the risk of emergency department revisit was lower in individuals living in nursing homes (hazard ratio 0.826 [0.742–0.920]) or at home with caregivers (hazard ratio 0.856 [0.750–0.976]).

Conclusion: The type of household was modestly associated with the one-year prognosis of patients ≥65 years of age discharged after attendance at an emergency department. Living in a nursing home is associated with an increased risk of death but a decreased risk of rehospitalization or emergency department revisit, while living at home with relatives or professional caregivers is associated only with a decreased risk of hospitalization and emergency department revisit, respectively.

1. Introduction

The aging of the population is a worldwide phenomenon. The percentage of the population ≥ 65 years has increased and will rise in the next few years [1]. In Europe, this population is expected to increase from 90.5 million in 2019 to 129.8 million by 2050 [2]. Elderly patients have a greater number of comorbidities and functional and cognitive limitations. As a result, they are not only more likely to become ill but also have atypical complaints and specific syndromes associated with frailty [3]. Emergency medicine and hospital emergency departments (ED) have to adapt to the specific characteristics of this population. In this sense, the European Task Force for Geriatric Emergency Medicine -a collaboration between the European Society for Emergency Medicine and the European Geriatric Medicine Society- agreed on a curriculum for professionals working in EDs to acquire specific knowledge and skills to guarantee the quality of care for this population and uphold the principles of evidence-based medicine [4,5]. Comprehensive Geriatric Assessment (CGA) in the ED is one of the main recommendations, and this concept is based on a holistic approach to the patient not only focused on the medical problem but also on the social and functional needs and the development of an integrated/coordinated care plan to meet those needs [6,7]. However, there is no clear evidence that conducting a CGA in EDs implies a better prognosis. [8]. Previous studies have investigated prognostic factors in elderly patients in the ED, but these were focused on clinical aspects [9,10,11] and on the main complaint [12]. There is a lack of studies analyzing the relationship between specific social issues, such as the type of household (TH), and the prognosis of patients attended in the ED. The household is defined as the group of people residing in the same home. Living alone at older ages has been associated with more EDs visits [13] and increased risk of mortality [14], while residing in a nursing home has been associated with poor prognosis [15].

The aim of this study was to analyze the potential influence of TH on the one-year outcomes of patients discharged after an index event requiring ED consultation in a large, unselected cohort of patients ≥65 years attended in 52 Spanish hospitals. The main hypothesis was that the TH determines these outcomes, making patients who need some kind of care more prone to developing adverse outcomes.

2. Methods

2.1. SIESTA network and EDEN project

The Spanish Investigators in Emergency Situations TeAm (SIESTA) research network was created in 2020 and is made up of researchers who mainly work in the ED. The main purpose is to deal with multidisciplinary research challenges in real clinical practice related to Emergency Medicine from a multicentric perspective with a wide representation of Spanish EDs. The network has a stable coordinating core and researchers from individual EDs can join when a research challenge arises according

to their interest and availability [16]. The first research challenge for SIESTA was COVID-19 and a summary of the results and 28 published papers have recently been presented [17].

The Emergency Department and Elder Needs (EDEN) challenge arose from the SIESTA network and its primary objective is to increase knowledge about socio-demographic, organizational, baseline, clinical, care and evolutionary aspects of the population ≥ 65 years consulting Spanish EDs. A retrospective multipurpose registry was designed for this purpose. The EDEN cohort included all patients consulting 52 Spanish EDs (17% of EDs of the Spanish public network) from April 1 to 7, 2019 (7 days). There were no exclusion criteria, and the EDs included all patients seen during the study period regardless of the reason for consultation. Extensive details of the EDEN registry have been published in detail previously [18]. In brief, EDEN included 228 primary variables corresponding to socio-demographic data, comorbidity, functional status and basal treatments, clinical aspects, consumption of diagnostic and therapeutic resources, final diagnosis in the ED, patient disposition after ED care, hospitalization (if any) and follow-up after discharge (either directly from the ED or after hospitalization). Follow-up was carried out by consulting the patient's medical history.

2.2. EDEN-6 study design

The EDEN-6 study was specifically designed to analyze the influence of the TH on the prognosis during the year after the index episode. We considered that with this approach we would obtain a representative sample of individuals 65 years of age with some potential health issues, including comorbidities and dependence, and in whom TH could influence further health care necessities. The TH was classified into 4 groups: patient living at home alone, patient living at home with relatives, patient living at home with a caregiver (irrespective of whether the patient lived with relatives or not) and patients living in a nursing home. Following this approach, we included all patients included in the EDEN registry who were discharged alive after the index episode (i.e., in-hospital deaths were not taken into account) and for whom the TH had been recorded.

2.3. Independent variables

We recorded 2 sociodemographic variables (age and sex), 8 variables related to the patient's baseline situation (Charlson Comorbidity Index, Barthel index, falls in the 6 months prior to consultation, walking ability, and previous diagnosis of dementia, depression and delirium, number of drugs taken as chronic treatment) and two variables related to management during the ED index event (length of stay >8 h, hospitalization during the index event). Data was compiled as stated in the ED medical report and then completed and checked using the medical reports of the previous hospital or ED consultations as well as the family doctor records.

2.4. Outcomes

The primary outcome variable was all-cause mortality at one year. As secondary outcomes, we considered rehospitalization and revisits to the ED at one year, regardless of the cause leading to rehospitalization or ED revisit. Time was considered from the day the patient was discharged home after the index event, irrespective of whether the discharge was made directly from the ED or after hospitalization. Outcome adjudication was made by the investigators at each center after revision of all the medical records available in the electronic health care system, without external review.

2.5. Statistical analysis

Quantitative variables are expressed as median and interquartile range (IQR), and qualitative variables as the number of cases and percentages. Differences between TH groups were assessed by the chi-square test for qualitative variables and the Kruskal-Wallis test for quantitative variables. Outcomes in the four TH groups were explored with survival tables and curves and compared using the log-rank test. The association between TH and outcomes was expressed as hazard ratios (HR) with the 95% confidence interval (CI), unadjusted and after progressive adjustments using demographic variables (model A), baseline patient characteristics (model B) and management in the ED during the index episode (model C, fully adjusted) using Cox regression models. For all comparisons, statistical significance was accepted if the *p* value was <0.05 or if the 95% CI of the risk estimations excluded the value 1. All the analyses were performed with the SPSS (v.24) statistical software package (IBM, Armonk, New York, USA) and figures were produced using Excel and Power Point 2016 (Microsoft Corporate Office, Redmond, Washington, USA).

2.6. Ethics

The EDEN project was approved by the Clinical Research Ethics Committee of the Hospital Clínico San Carlos de Madrid (protocol HCSC/22/005-E). Due to the non-interventional design of the registry, Spanish legislation allows central Ethical Committee approval, accompanied by notification to the local Ethical Committees. The present study was carried out in strict compliance with the principles of the Declaration of Helsinki.

3. Results

Of the 25,557 patients included in the EDEN cohort, 13,442 were discharged alive, the TH had been reported and they were analyzed in the EDEN-6 study. There were 1635 (12.2%) patients living alone, 10,063 (74.9%) with relatives, 525 (3.9%) with a caregiver and 1219 (9.1%) in a nursing home (Fig. 1). The mean age was 79 years (IQR 72–86) and 6235 (56%) were women. Table 1 shows the remaining baseline and management characteristics. There were statistically significant differences in all variables analyzed depending on the TH. When comparing patients according to the TH, those living alone and with relatives showed several similarities, as did those living at home with a professional caregiver and in a nursing home. It was of note that patients living at home alone or with relatives were younger, had fewer comorbidities, better functional capacity and fewer geriatric syndromes, and they stayed less time in the ED and needed less hospitalization during the index event (Table 1).

At one year of follow-up, 1859 patients had died (cumulative mortality of 14.0%), 3965 patients required rehospitalization (cumulative hospitalization of 29.7%) and 7936 patients reconsulted the ED (cumulative ED revisit of 59.3%). According to the TH, there were statistically significant differences in the risk of death and hospitalization, but not in the risk of ED revisit (Fig. 2). In fact, in the crude analysis of one year mortality, an increase in mortality was observed in all groups (living in nursing home, with a caregiver, with relatives) compared to patients living alone, while an increase in the risk of hospitalization and revisits was observed in patients living with a caregiver or in a nursing home (compared to living alone), but not in patients living with relatives (Fig. 2).

Progressive adjustments of outcomes showed that a substantial part of the relationship between TH and outcomes was not due to differences in demographics (age and sex) or management in the ED during the index episode (prolonged stay in the ED stay or hospitalization), which barely modified the estimation of associations, but was due to differences in the baseline status of the patients, which was responsible for most of the change between the unadjusted and fully adjusted model. In
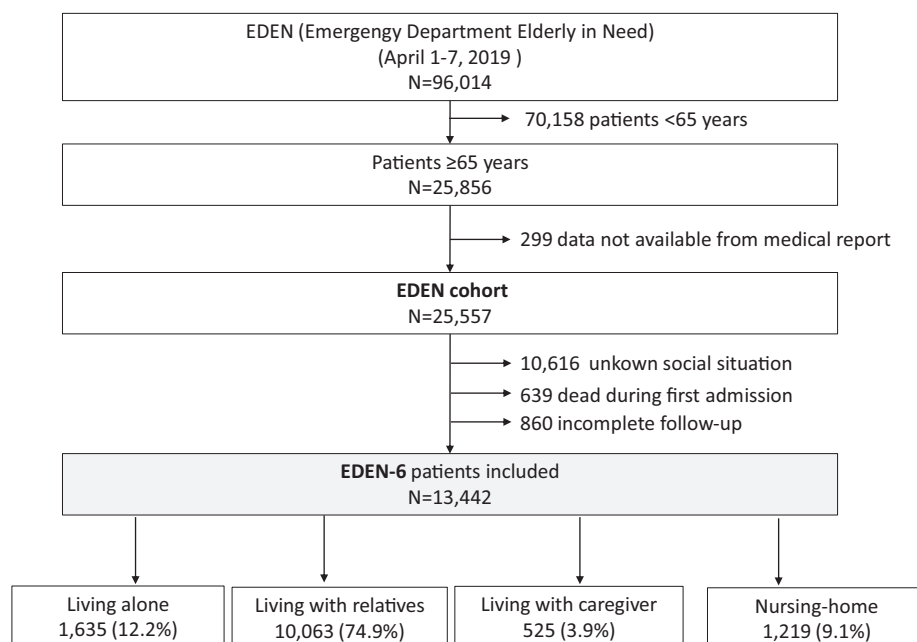

Fig. 1. Flowchart for patient inclusion.
ED: emergency department.

Table 1
Baseline characteristics of the patients included in the EDEN-6 study.

	All patients N = 13,442 n (%)	Living at home alone N = 1635 n (%)	Living at home with relatives N = 10,063 n (%)	Living at home with professional caregiver N = 525 n (%)	Living in nursing home N = 1219 n (%)	p
Demographic data						
Age (years) [median (IQR)]	79 (72–86)	79 (73–85)	78 (72–85)	85 (80–90)	87 (81–91)	<0.001
- Age ≥ 80 years	6235 (47.1)	750 (45.9)	4257 (42.3)	391 (74.5)	927 (76)	<0.001
Female sex[a]	7737 (55.8)	986 (61.5)	5280 (53.7)	351 (68.2)	720 (60.5)	<0.001
Baseline situation						
Charlson Comorbidity Index (points) [median (IQR)]	2 (1–3)	1 (0–3)	2 (1–3)	2 (1–3)	2 (1–4)	<0.001
- Severe comorbidity (≥5 points)	2023 (15)	175 (10.7)	1486 (14.8)	117 (22.3)	245 (20.1)	<0.001
Barthel index						<0.001
- No or minimal dependence (Barthel index >90 points) (100–95 points)	7975 (59.3)	1285 (78.6)	6465 (64.2)	95 (18.1)	130 (10.7)	
- Mild to moderate dependence (Barthel index <95–60 points)	3763 (28.3)	323 (19.8)	2665 (26.5)	288 (54.9)	487 (40)	
- Severe or total dependence (Barthel index <60 points)	1704 (12.7)	27 (1.7)	933 (9.3)	142 (27)	602 (49.4)	
Walking ability						<0.001
- Walking without help	8698 (64.7)	1402 (85.7)	6982 (69.4)	136 (25.9)	178 (14.6)	
- Walking with help	3702 (27.5)	224 (13.7)	2560 (25.4)	136 (25.9)	613 (50.3)	
- Unable to walk	1042 (7.8)	9 (0.6)	521 (5.2)	84 (16)	428 (38.1)	
Falls in the previous 6 months	1105 (8.2)	151 (9.2)	699 (6.,9)	78 (14.9)	177 (14.5)	<0.001
Diagnosed with dementia	2367 (17.6)	86 (5.3)	1351 (13.4)	221 (42.1)	709 (58.2)	<0.001
Diagnosed with depression	1936 (14.4)	231 (14.1)	1330 (13.2)	111 (21.1)	264 (21.7)	<0.001
Previous episodes of delirium	482 (3.6)	21 (1.3)	272 (2.7)	32 (6.1)	157 (12.9)	<0.001
Number of drugs taken as chronic treatment [median (IQR)]	6 (4–9)	6 (3–9)	6 (3–9)	8 (5–11)	7 (5–10)	<0.001
Management during the index ED event						
Prolonged stay in the ED (>8 h)	2823 (21.0)	311 (19.0)	2001 (19.9)	162 (30.9)	349 (28.6)	<0.001
Hospitalized during the index event	3229 (24.0)	352 (21.5)	2270 (22.6)	161 (36.6)	446 (36.5)	<0.001

ED: emergency department; IQR: interquartile range.
[a] There were 292 patients (2.2%) for whom sex was not reported or identifiable from the medical reports.

the fully adjusted model, the 1-year mortality was only increased in patients living in a nursing home (HR = 1.336, 95% CI 1.101–1.695), but not in the remaining TH groups. On the other hand, the risk of hospitalization was lower in individuals living in nursing homes (HR = 0.783; 95% CI 0.676–0.907) and at home with relatives (HR = 0.897; 95% CI 0.810–0.992), while the risk of ED revisit was lower in individuals living in nursing homes (HR = 0.826 (95% CI 0.742–0.920)) and at home with professional caregivers (HR = 0.856; 95% CI 0.750–0.976) (Fig. 3).

4. Discussion

EDEN-6 is the largest study to date to analyze the one-year prognosis of a cohort based on the TH. The cohort was made up of unselected patients 65 years or older who consulted the ED with urgent complaints and were followed during one year after being discharged (from the ED or after hospitalization). This cohort constitutes a population group at high-risk of developing adverse outcomes needing urgent health care or hospitalization or at risk of death, as apart from their age, the number of comorbidities in this population is frequently high and some have acute or chronic geriatric syndromes. As expected, patients requiring a caregiver at home or living in a nursing home are usually older and more severely disabled. Despite these differences among groups, we believe

that our study provides three main findings that should be highlighted.
First, the distribution of the patients included according to TH differs from the data of the general population. In Spain, approximately 25% of patients ≥65 years live alone, and about 4% live in a nursing home [19,20], in contrast to our study in which 12.2% of patients lived alone and 9.1% lived in a nursing home. These findings suggest that ED visits involve a subgroup of patients with worse general health conditions than the total reference population of the same age group.
Second, the three outcomes studied – mortality, readmission and ED revisit - were higher than in the general population of the same age group. The mortality at one year in our cohort was 14.0%, while in Spain the mortality at one year for patients ≥65 years is 4.22%. Rehospitalization was 29.7%, whereas in the general population the one-year risk of hospitalization is around 23.4% [21]. It should be emphasized that 59.3% of the patients included reconsulted the ED within one year of the index visit. In accordance with the previous section, ED visits should be considered a red flag indicating that the patient's health is worse than that of the general population of the same age group. In addition to treating the acute condition, ED visits can be used to evaluate the patient from a holistic approach, based on the CGA, identifying those at highest risk of poor outcomes and most likely to benefit from further interventions [22].
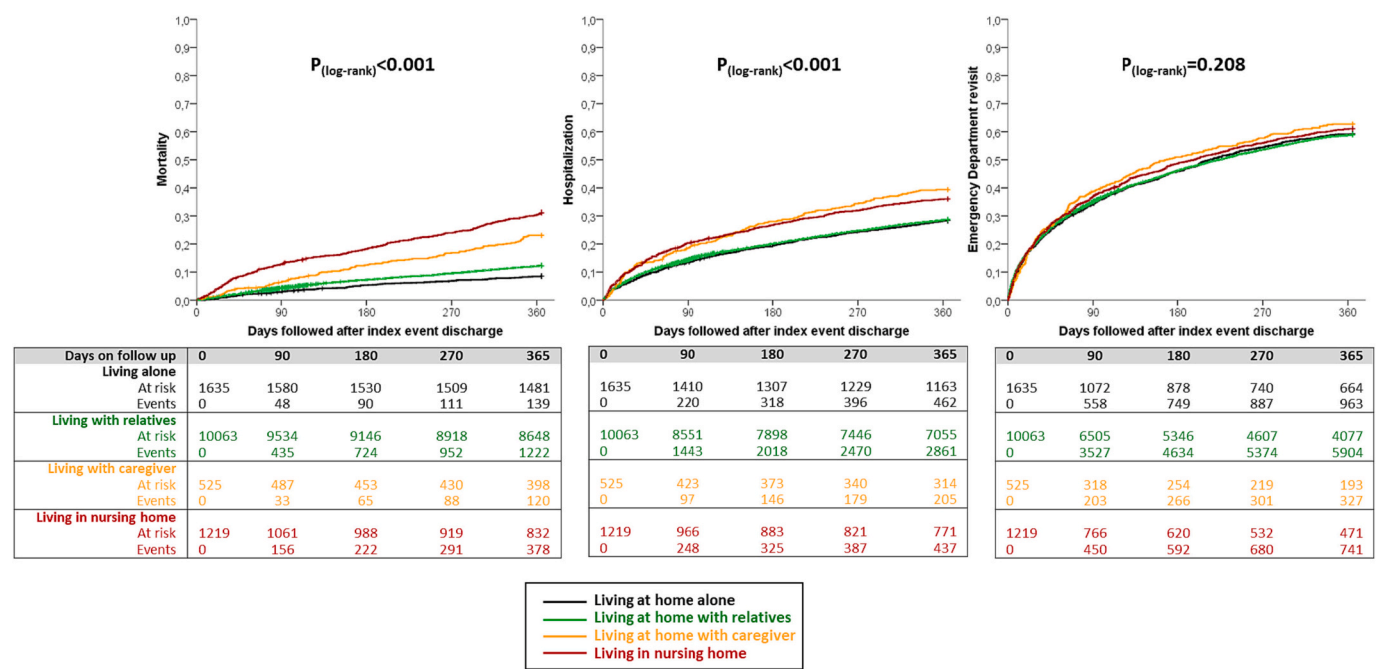Third, on analyzing the relationship between the TH and the

Kaplan-Meier curves for the primary (mortality, left) and secondary outcomes (hospitalization, center; and emergency department revisit, right) according to the type of household.

Mortality (left)

Days on follow up	0	90	180	270	365
Living alone					
At risk	1635	1580	1530	1509	1481
Events	0	48	90	111	139
Living with relatives					
At risk	10063	9534	9146	8918	8648
Events	0	435	724	952	1222
Living with caregiver					
At risk	525	487	453	430	398
Events	0	33	65	88	120
Living in nursing home					
At risk	1219	1061	988	919	832
Events	0	156	222	291	378

Hospitalization (center)

	0	90	180	270	365
At risk	1635	1410	1307	1229	1163
Events	0	220	318	396	462
At risk	10063	8551	7898	7446	7055
Events	0	1443	2018	2470	2861
At risk	525	423	373	340	314
Events	0	97	146	179	205
At risk	1219	966	883	821	771
Events	0	248	325	387	437

Emergency Department revisit (right)

	0	90	180	270	365
At risk	1635	1072	878	740	664
Events	0	558	749	887	963
At risk	10063	6505	5346	4607	4077
Events	0	3527	4634	5374	5904
At risk	525	318	254	219	193
Events	0	203	266	301	327
At risk	1219	766	620	532	471
Events	0	450	592	680	741

Legend:
— Living at home alone
— Living at home with relatives
— Living at home with caregiver
— Living in nursing home

Fig. 2. Kaplan-Meier curves for the primary (mortality, left) and secondary outcomes (hospitalization, center; and emergency department revisit, right) according to the type of household.

different outcomes, it was of note that residing in a nursing home compared to living alone was the only factor associated with a higher mortality at one year. To some extent this result is predictable since nursing homes care for not only patients with a worse baseline condition but also those with medical pathologies. Previous studies have reported one-year mortality rates of between 17.4% and 35.0% in nursing home patients [23,24]. However, it must be noted that living alone was not related to mortality in either the crude or adjusted analysis. Prior studies of the general population indicated that living alone is an independent risk factor for mortality. In a model adjusted for multiple factors including socioeconomic status, physical health, health behaviors and loneliness, Abell et al. reported a HR = 1.20 (95% CI 1.04–1.38) [14] for mortality. In another study with a 32-year follow-up, living alone had a HR = 1.23 (95% CI 1.04–1.38) in the mortality risk adjusted analysis [25]. These studies are based on the general population and included some patients younger than 65. Another report demonstrated that the risk of death from living alone rose with age but was not significant in patients ≥75 years of age. [26]. The present study was conducted in patients attended in EDs and the TH variable was categorized into 4 groups and not dichotomized. It is feasible that nursing homes and caregiver patients have a worse overall health as they require particular care, but also in our country it is common for relatives to assume the role of caregiver. Care for the elderly is generally provided in different settings: informally by relatives or friends (informal care) or formally. Formal care is subdivided into care provided by paid helpers in the elderly person's home (formal home care) and nursing homes. In Spain, 57% of frail patients receive informal care and 26% have a caregiver plus relatives, while only 8% live exclusively with a caregiver and 8% reside in a nursing home [27]. In this study, these categories had higher rates of all the variables explored (Charlson, Barthel, walking without help, dementia, previous delirium, depression, number of drugs taken as chronic treatment) except for falls in the previous 6 months, which was higher in patients living alone than in those living with relatives. It is plausible that people living alone have limited social support and this may increase the risk of mortality. However, an older person living alone is more likely to have a preserved functional status that allows them to live without assistance. These two factors interact in such a way that living alone is not associated with mortality [26]. Rehospitalization at

one year was higher in the group living alone than in the other groups. This result can be explained by the fact that health problems would be detected earlier in accompanied patients, thereby avoiding hospital admission and instead doing outpatient consultation. Likewise, the group living alone had the highest ED reconsultation rate, although the difference observed was only statistically significant with respect to the caregiver and nursing home groups. This result coincides with a previous study carried out in the general population in which loneliness had higher adjusted odds for an ED visit (odds ratio = 1.13; 95% CI:1.05–1.21) [13].

The present results highlight the need to explore the TH in patients ≥65 years of age who consult the ED. This could help to detect the potential risk of the resources in their environment from the ED. In this way, correct transition between the ED, primary care centers, nursing homes or family support can be more easily ensured.

4.1. Limitations

The EDEN-6 has some limitations. First, the 52 EDs of the SIESTA network that contributed patients were not chosen at random but rather expressed their interest in participating. However, the broad representation both territorially (12 of the 17 autonomous communities were represented) and in terms of typology (including university, high-technology and regional hospitals) means that the bias in this regard is probably small. Second, the analysis presented here was not carried out by nosological groups but rather globally. This may mean that the findings are conditioned by certain processes, which are not analyzed in this study. Third, this was a secondary analysis of a multipurpose cohort, and thus, the associations presented may be influenced by factors not covered in the cohort design. Therefore, the findings should be considered as hypothesis-generating and should be confirmed by studies specifically designed for this purpose. Fourth, due to the design of the study, it is not possible to know if the patients living with relatives required any type of help from these relatives, or if caregivers were full-time or part-time, or if the patients with a caregiver were also living with relatives. Furthermore, the results may have also been influenced by the changing prevalence of certain nosological processes throughout the year. In particular, the time period chosen (first week of April) is still under the
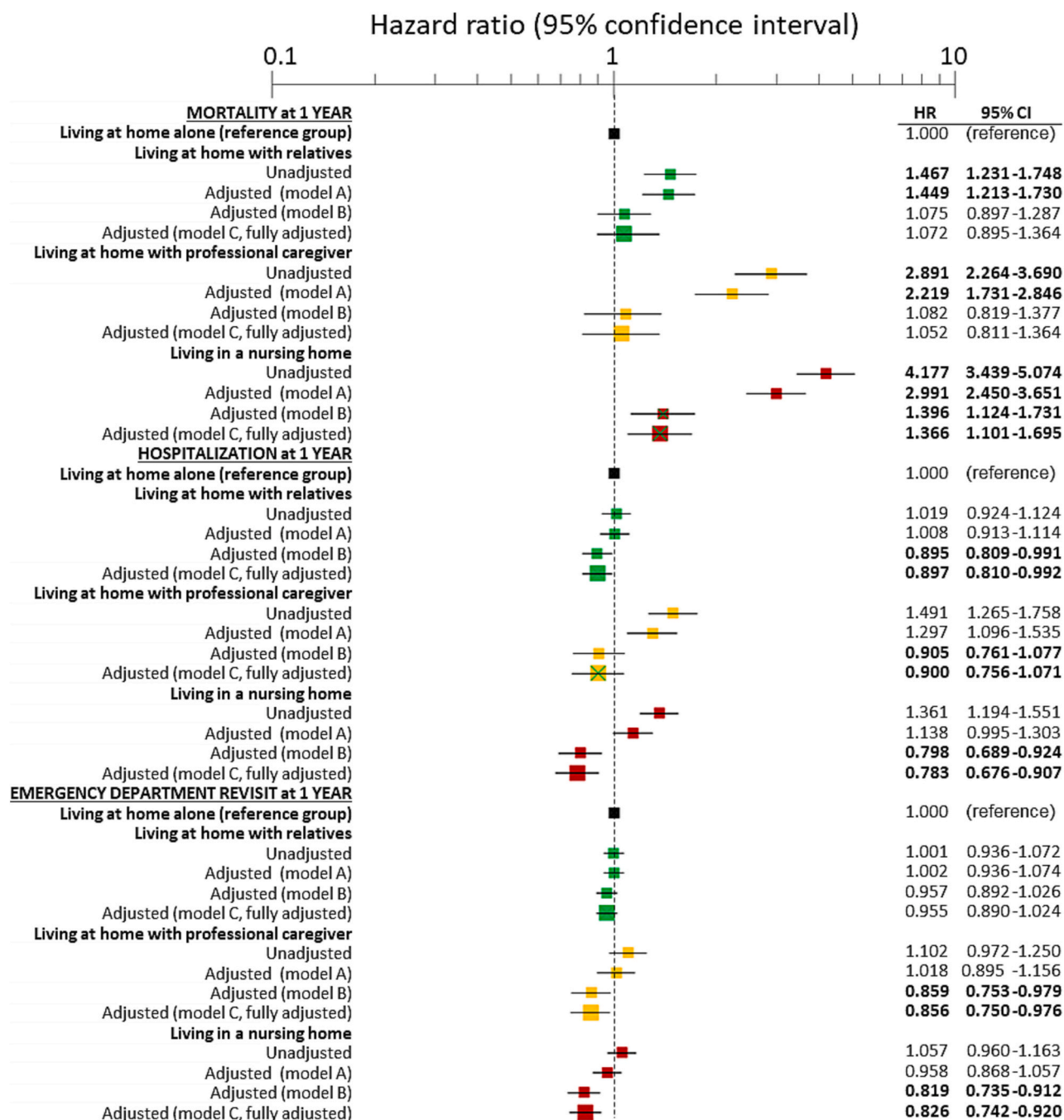
Fig. 3. Crude and adjusted hazard ratios for the primary (mortality, up) and secondary outcomes (hospitalization, middle; and emergency department revisit, bottom) according to the type of household.
Model A of adjustment included sex and age as demographic covariables.
Model B of adjustment included, in addition to model A covariables, the Charlson Comorbidity Index, the Barthel index, falls in the 6 months prior to consultation, walking ability, previous diagnosis of dementia, depression and delirium, and number of drugs taken as chronic treatment as baseline status covariables.
Model C of adjustment included, in addition to model B covariables, the time spent in the emergency department and hospitalization as well as management during the emergency department index event covariables.
HR: hazard ratio; CI: confidence interval.

conditions imposed by the usual influenza and viral pandemics of winter and early spring. Therefore, there could be variations when analyzing other periods of the year. Finally, the inclusion of patients in the EDEN-6 cohort was done by ED consultations rather than by patients, and it is possible that some patients had more than one ED consultation. However, given that the inclusion period was very short (7 days), the chances of a repeat visit by a particular patient can be considered low. Finally, since this was a retrospective study, causation cannot be inferred.

5. Conclusion

The TH is modestly associated with the one-year prognosis of patients ≥65 years of age discharged after a consultation to the ED. Living in nursing homes is associated with an increased risk of death but with a decreased risk of rehospitalization or ED revisit, while living at home with relatives or professional caregivers is only associated with a decreased risk of hospitalizations and ED revisit, respectively.

6

Contributors

Aitor Alquézar-Arbé contributed to conception, design, statistical analysis, and drafting and revision of the paper for important intellectual content.

Gina I. Osorio contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Javier Jacob contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Eric Jorge García-Lamberechts contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Pascual Piñera Salmerón contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Pere Llorens contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Guillermo Burillo-Putze contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Angela Cobos Requena contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Adriana Gil contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Cesáreo Fernández contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Sira Aguiló contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Sònia Jiménez contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Beatriz Escudero Blázquez contributed to drafting and revision of the paper for important intellectual content.

Diana Rosendo Mesino contributed to drafting and revision of the paper for important intellectual content.

Enrique Martín Mojarro contributed to drafting and revision of the paper for important intellectual content.

Aarati Vaswani-Bulchand contributed to drafting and revision of the paper for important intellectual content.

Montserrat Rodríguez-Cabrera contributed to drafting and revision of the paper for important intellectual content.

Pedro Alarcón Martínez contributed to drafting and revision of the paper for important intellectual content.

Gema Dominguez Gioya contributed to drafting and revision of the paper for important intellectual content.

Francesc Xavier Alemany González contributed to drafting and revision of the paper for important intellectual content.

Matilde González Tejera contributed to drafting and revision of the paper for important intellectual content.

María Bóveda García contributed to drafting and revision of the paper for important intellectual content.

Begoña Espinosa Fernández contributed to drafting and revision of the paper for important intellectual content.

Ferran Llopis contributed to drafting and revision of the paper for important intellectual content.

Coral Suero Méndez contributed to drafting and revision of the paper for important intellectual content.

Juan González del Castillo contributed to conception and design, and drafting and revision of the paper for important intellectual content.

Òscar Miró contributed to conception, design, statistical analysis, and drafting and revision of the paper for important intellectual content.

All authors approved the final approval of manuscript.

Funding

Ethical approval

The EDEN project was approved by the Clinical Research Ethics Committee of the Hospital Clínico San Carlos de Madrid (protocol HCSC/22/005-E). Due to the non-interventional design of the registry, Spanish legislation allows central Ethical Committee approval, accompanied by notification to the local Ethical Committees. The present study was carried out in strict compliance with the principles of the Declaration of Helsinki.

Provenance and peer review

This article was not commissioned and was externally peer reviewed.

Research data (data sharing and collaboration)

There are no linked research data sets for this paper. Data will be made available on request.

Declaration of competing interest

The authors declare that they have no competing interest.

Appendix A

SIESTA network researchers

Hospital Clínico San Carlos, Madrid: Juan González del Castillo, Cesáreo Fernández Alonso, Jorge García Lamberechts, Estrella Serrano Molina, Julia Barrado Cuchillo, Leire Paramas Lopez, Ana Chacón García, Paula Queizán García, Andrea B Bravo Periago. Hospital Universitario Infanta Cristina, Parla: Ángel Iván Diaz Salado. Hospital Santa Tecla, Tarragona: Sílvia Flores Quesad. Hospital Universitario de Canarias, Tenerife: Guillermo Burillo Putze, Aarati Vaswani- Bulchand, Patricia Eiroa-Hernández. Hospital Norte Tenerife: Montserrat Rodríguez-Cabrera, Patricia Parra-Esquivel. Hospital General Universitario Reina Sofía, Murcia: Pascual Piñera Salmerón, Pedro Alarcón Martinez, Mabel Coromoto Suárez Pineda, Manuel E. Castillo Vargas, María del Carmen Molina Morazo. Hospital Universitario del Henares, Madrid: Gema Dominguez Gioya, María Adalid Moll, Patricia Gantes Nieto, Virginia Arroyo Linares. Hospital Clínic, Barcelona: Òscar Mir, Sònia Jiménez, Sira Aguiló Mir, Francesc Xavier Alemany González, María Florencia Poblete Palacios, Claudia Lorena Amarilla Molinas, Ivet Gina Osorio Quispe, Sandra Cuerpo Cardeñosa. Hospital General Universitario de Elche. Cristina Chacón Garcia, Ana Puche Alcaraz. Hospital Universitario y Politécnico La Fe, Valencia: Leticia Serrano Lázaro, Javier Millán Soria, Jésica Mansilla Collado, María Bóveda García. Hospital Universitario Dr Balmis, Alicante: Pere Llorens Soriano, Adriana Gil Rodrigo, Begoña Espinosa Fernández, Mónica Veguillas Benito, Sergio Guzmán Martínez, Gema Jara Torres, María Caballero Martínez. Hospital Universitario de Bellvitge, L'Hospitalet de Llobregat, Barcelona: Javier Jacob Rodríguez, Ferran Llopis, Elena Fuentes, Lidia Fuentes, Francisco Chamorro, Lara Guillen, Nieves López. Hospital de Axiarquia, Málaga: Coral Suero Méndez, Lucía Zambrano Serrano, Rocío Muñoz Martos. Hospital Regional Universitario de Málaga: Manuel Salido Mota, Valle Toro Gallardo, Antonio Real López, Lucía Ocaña Martínez, Esther Muñoz Soler, Mario Lozano Sánchez. Hospital Santa Barbara, Soria: Fahd Beddar Chaib, Rodrigo Javier Gil Hernández. Hospital Valle de los Pedroches, Pozoblanco, Córdoba: Jorge Pedraza García, Hospital Universitario Reina Sofía. Córdoba: F. Javier Montero-Pérez, Carmen Lucena Aguilera, F. de Borja Quero Espinosa, Ángela Cobos Requena, Esperanza Muñoz Triano, Inmaculada Bajo Fernández, María Calderón Caro, Sierra Bretones Baena. Hospital Universitario Gregorio Marañón, Madrid: Jorge Sánchez-Tembleque Sánchez. Belén Macías Bou, Paloma Díez Romero, María Fernández Cardona, Leonor Andrés Berián, María Esther Martinez Larrull, Susana Gordo Remartinez, Ana Isabel Castuera Gil. Hospital Universitario de Burgos: Karla López López, Ricardo Hernández Cardona, Leopoldo Sánchez Santos, Monika D' Oliveira Millán, Amanda Ibisate Cubillas. Complejo Asistencial Universitario de León: Marta Iglesias Vela, Mónica Santos Orús,

Rudiger Carlos Chávez Flores, Alberto Álvarez Madrigal, Albert Carbó Jordá, Enrique González Revuelta, Héctor Lago Gancedo, M Isabel Fernandez Gonzalez Hospital Universitario Morales Meseguer, Murcia: Esperanza Marín Arranz, Ana Barnes Parra, Sara Sánchez Aroca. Hospital Francesc de Borja de Gandía, Valencia: Alba Morant Gimérez, Iván Gelenchev Zhelyazkov , Ángela Muñoz Navarro Hospital Universitario Severo Ochoa, Leganés. Madrid: Beatriz Mañero Criado, Raquel Torres Gárate, Rebeca González González, Cristina Iglesias Frax, Teresa Agudo Villa Hospital Clínico Universitario Virgen Arrixaca, Murcia: Laura Bernal Martínez, Marina Carrión Fernández, Miguel Parra Morata Hospital Universitario Lorenzo Guirao, Cieza, Murcia: Alberto Artieda Larrañaga, José Joaquín Giménez Belló Hospital Universitario Dr. Josep Trueta, Girona: María Adroher Muñoz, Eduard Anton Poch Ferrer, Hospital de Mendaro, Guipuzkoa: Jeong-Uh Hong Cho. Hospital Universitario Miguel Servet, Zaragoza: Patricia Trenc Español, Fernando López López, Jorge Navarro Calzada, Alberto Guillén Bobé, Violeta González Guillén, María Diamanti, Beatriz Casado Ramón Hospital Comarcal El Escorial, Madrid: Sara Gayoso Martín. Hospital Do Salnes, Villagarcia de Arosa, Pontevedra: María Goretti Sánchez Sindín. Hospital de Barbanza, Ribeira, A Coruña: Martina Silva Penas. Hospital del Mar, Barcelona: M Carmen Petrus Rivas, Bárbara Gómez y Gómez. Hospital Santa Creu y Sant Pau, Barcelona: Paola Ponte Márquez, Carlos Romero Carrete, Isel Borrego, Laura Lozano Polo, Roser Arenos Sambro, José María Guardiola Tey, Carme Beltrán Vilagrasa. Hospital de Vic, Barcelona: Lluís Llauger. Hospital Valle del Nalón, Langreo, Asturias: Ana Murcia Olagüenaga, Sayoa Francesena González Hospital Altagracia, Manzanares, Cuidad Real: Antonio Rodríguez Mejía. Hospital Nuestra Señora del Prado de Talavera de la Reina, Toledo: Ricardo Juárez González, Mar Sousa, Mónica Cañete. Hospital Universitario Vinalopó, Elche, Alicante: Esther Ruescas, María Martínez Juan, María José Blanco Hoffman. Hospital de Móstoles, Madrid: Gema Gómez García, Beatriz Paderne Díaz. Hospital Virgen del Rocio. Sevilla. Amparo Fernandez-Simon Almela, Esther Perez Garcia, Pedro Rivas Del Valle, Maria Sanchez Moreno, Rafaela Rios Gallardo, Teresa Pablos Pizarro, Ana Gómez Caminero, Claudio Bueno Mariscal Hospital General Universitario Dr. Peset. Valencia. María Amparo Berenguer Diez. María Ángeles de Juan Gómez. María Luisa López Grima, Rigoberto Jesús del Rio Navarro Hospital Universitario Son Espases. Palma de Mallorca. Juan Domínguez Casasola, Pere Rull Bertrán, Marina Truyol Más. Clinica Universitaria Navarra Madrid. Nieves López-Laguna. Hospital Clínico Universitario de Valencia. José J. Noceda Bermejo, María Teresa Sánchez Moreno, Raquel Benavent Campos, Jacinto García Acosta, Alejandro Cortés Soler. Hospital Alvaro Cunqueiro.Vigo. María Teresa Maza Vera, Raquel Rodríguez Calveiro, Paz Balado Dacosta, Violeta Delgado Sardina, Emma González Nespereira, Carmen Fernández Domato, Elena Sánchez Fernández-Linares. Hospital Universitario de Salamanca. Ángel García García, Francisco Javier Diego Robledo, Manuel Ángel Palomero Martín, Jesús Ángel Sánchez Serrano. Hospital de Zumarraga. Gipuzkoa. Patxi Ezponda. Hospital Virxe da Xunqueira. La Coruña. Andrea Martínez Lorenzo. Hospital Central Asturias. Pablo Herrero Puente. Hospital Juan Ramón Jiménez. Huelva: Jose Maria Santos Martin, Setefilla Borne Jerez, Asumpta Ruiz Aranda.

References

[1] World population ageing 2019. Highlights, United Nations. Department of Economics and Social Affairs. . Available at, https://www.who.int/news-room/fact-sheets/detail/ageing-and-health#:~:text=By%202030%2C%201%20in%206,will%20double%20(2.1%20billion) (Accessed on November 19, 2022).

[2] Ageing Europe - statistics on population developments Eurostat, Available at, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Ageing_Europe_-_statistics_on_population_developments (Accessed on November 19, 2022).

[3] M. Puig-Campmany, Romeu J. Ris, Frail older patients in the emergency department: main challenges, Emergencias 34 (2022) 415–417.

[4] S.P. Mooijaart, J.A. Lucke, M. Brabrand, S. Conroy, C.H. Nickel, Geriatric emergency medicine: time for a new approach on a European level, Eur J Emerg Med 26 (2019) 75–76, https://doi.org/10.1097/MEJ.0000000000000594.

[5] J.A. Lucke, S.P. Mooijaart, P. Heeren, K. Singler, R. McNamara, T. Gilbert, et al., Providing care for older adults in the Emergency Department: expert clinical recommendations from the European Task Force on Geriatric Emergency Medicine, Eur. Geriatr. Med. 13 (2022) 309–317, https://doi.org/10.1007/s41999-021-00578-1.

[6] S.G. Parker, P. McCue, K. Phelps, A. McCleod, S. Arora, K. Nockels, S. Kennedy, H. Roberts, S. Conroy, What is Comprehensive Geriatric Assessment (CGA)? An umbrella review, Age Ageing 47 (2018) 149–155, https://doi.org/10.1093/ageing/afx166.

[7] F.J. Martín-Sánchez, Boixareu C. Bermejo, EDEN — the emergency department and elder needs project — is a chance to understand and improve a whole-system approach to elder care in Spanish emergency departments, Emergencias 34 (2022) 409–410.

[8] S. Harding, Comprehensive geriatric assessment in the emergency department, Age Ageing 49 (2020) 936–938, https://doi.org/10.1093/ageing/afaa059.

[9] A. Elliott, N. Taub, J. Banerjee, F. Aijaz, W. Jones, L. Teece, J. van Oppen, S. Conroy, Does the clinical frailty scale at triage predict outcomes from emergency care for older people? Ann. Emerg. Med. 77 (2021) 620–627, https://doi.org/10.1016/j.annemergmed.2020.09.006.

[10] LaMantia MA, T.F. Platts-Mills, K. Biese, C. Khandelwal, C. Forbach, C.B. Cairns, J. Busby-Whitehead, J.S. Kizer, Predicting hospital admission and returns to the emergency department for elderly patients, Acad. Emerg. Med. 17 (2010) 252–259 (doi: 11.1111/j.1553-2712.2009.00675.x).

[11] K. Kemp, J. Alakare, M. Kätkä, M. Lääperi, L. Lehtonen, M. Castrén, Accuracy of Emergency Severity Index in older adults, Eur J Emerg Med 29 (2022) 204–209, https://doi.org/10.1097/MEJ.0000000000000900.

[12] A. García-Martínez, A. Gil-Rodrigo, A. Placer, X. Alemany, S. Aguiló, V. Torres-Machado, et al., Probability of new falls and factors associated with them in aged patients treated in emergency departments after falling: data from the FALL-ER registry, Emergencias 34 (2022) 444–451.

[13] S.A. Chamberlain, R. Savage, S.E. Bronskill, L.E. Griffith, P. Rochon, J. Batara, A. Gruneir, Examining the association between loneliness and emergency department visits using Canadian Longitudinal Study of Aging (CLSA) data: a retrospective cross-sectional study, BMC Geriatr. 22 (2022) 69, https://doi.org/10.1186/s12877-022-02763-8.

[14] J.G. Abell, A. Steptoe, Why is living alone in older age related to increased mortality risk? A longitudinal cohort study, Age Ageing 50 (2021) 2019–2024, https://doi.org/10.1093/ageing/afab155.

[15] H.E. Wang, M.N. Shah, R.M. Allman, M. Kilgore, Emergency department visits by nursing home residents in the United States, J. Am. Geriatr. Soc. 59 (2011) 1864–1872, https://doi.org/10.1111/j.1532-5415.2011.03587.x.

[16] J. González Del Castillo, O. Miró, Contributions of the Spanish Investigators in the Emergency Situations TeAm network to COVID-19 knowledge: an example of how emergency physicians can lead first-class research, Eur J Emerg Med 29 (2022) 160–162, https://doi.org/10.1097/MEJ.0000000000000919.

[17] O. Miró, J. González Del Castillo, SIESTA — the Spanish investigators in emergency situations TeAm — during the COVID-19 pandemic: a summary of results of the network's first challenge, Emergencias 34 (2022) 225–227.

[18] O. Miró, J. Jacob, E.J. García-Lamberechts, P. Piñera Salmerón, P. Llorens, S. Jiménez, et al., Sociodemographic characteristics, functional status, and health resource use of older patients treated in Spanish emergency departments: a description of the EDEN cohort, Emergencias 34 (2022) 418–427.

[19] Continuous household survey, Available at:, Press note. Spanish National Institute of Statistics, 2020. https://www.ine.es/prensa/ech_2020.pdf (Consulted 19 November 2022).

[20] Report of residences for the elderly in Spain, Available at, Spanish Association of Dependency Enterprises, 2020. https://dependencia.info/imagenes/radiografia-sector-residencias-pwc.pdf (Accessed on November 19, 2022).

[21] Annual report of the National Health System 2020-2021. Executive summary, Ministry of Health. . Available at, https://www.sanidad.gob.es/estadEstudios/estadisticas/sisInfSanSNS/tablasEstadisticas/InfAnualSNS2020_21/Inf_anual_2020_21_Res_Ejecutivo.pdf (Accessed on November 19, 2022).

[22] C. Fernández Alonso, On older persons living in residential facilities and their care in emergency health services, Emergencias 34 (2022) 411–412.

[23] M. Tabue-Teguo, E. Kelaiditi, L. Demougeot, J.F. Dartigues, B. Vellas, M. Cesari, Frailty index and mortality in nursing home residents in France: results from the INCUR Study, J. Am. Med. Dir. Assoc. 16 (2015) 603–606, https://doi.org/10.1016/j.jamda.2015.02.002.

[24] C. Vossius, G. Selbæk, J. Šaltytè Benth, S. Bergh, Mortality in nursing home residents: a longitudinal study over three years, PLoS One 13 (2018), e0203480, https://doi.org/10.1371/journal.pone.0203480.

[25] M.T. Jensen, J.L. Marott, A. Holtermann, et al., Living alone is associated with all-cause and cardiovascular mortality: 32 years of follow-up in the Copenhagen Male Study, Eur. Heart J. Qual. Care Clin. Outcomes 5 (2019) 208–217, https://doi.org/10.1093/ehjqcco/qcz004.

[26] B. Gopinath, E. Rochtchina, K.J. Anstey, P. Mitchell, Living alone and risk of mortality in older, community-dwelling adults, JAMA Intern. Med. 173 (2013) 320–321, https://doi.org/10.1001/jamainternmed.2013.1597.

[27] Daniel Barczyk, Matthias Kredler, Long-term care across Europe and the United States: the role of informal and formal care, Fisc. Stud. (2019) 329–373, https://doi.org/10.1111/1475-5890.12200.