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Characteristics, management, and predictors of 6-month mortality in very elderly patients admitted for decompensated heart failure

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ABSTRACT

Background Patients aged 85 years or older admitted for heart failure (HF) have increased enormously due to improved survival in this disease. However, few studies assess the characteristics, treatments, and prognosis of very elderly patients admitted for acute HF.

Methods This study is a retrospective analysis of the EPICTER registry, that included patients admitted for acute HF in 74 Spanish hospitals. For this analysis, a total of 1887 patients were included and divided into 2 groups: 85 years or older (very elderly, 680 patients) and those under 85 years.

Results Compared to patients < 85 years, very elderly patients were more frequently women, had more hypertension and disease cerebrovascular disease, and less presence of chronic obstructive pulmonary disease (COPD), diabetes, and acute myocardial infarction. There were no differences in symptoms, except for delirium, significantly more common in very elderly patients. Management of these patients was more conservative and died more than the younger ones (41% *vs.* 25%, $P < 0.001$). The predictor variables of mortality in very elderly patients were the presence of COPD and peripheral arterial disease, delirium, and estimated survival of less than 6 months assessed by the physician in charge of the patient care.

Conclusion Very elderly patients admitted for HF differ from younger ones in comorbidities, management, and symptoms, and have higher mortality. The presence of delirium, peripheral arterial disease, and COPD worsen the prognosis in these patients and can help to adapt the therapeutic effort and place emphasis on adequate symptom control.

Heart failure (HF) is a disease that mainly affects older people.[1] With the increase in therapeutic options provided to patients with HF, survival has greatly improved.[1] Because of this, patients admitted for HF aged 85 or over are becoming more frequent. However, such elderly patients are not included in clinical trials, and these patients are underrepresented in real-life registries.[2-3]

Very old patients have different characteristics in terms of comorbidities, frailty, and causes of mortality.[4–6] However, data on the clinical profile, management, treatments, complications during admission, and modes of death in very elderly patients admitted for HF are very scarce.

A previous study conducted with the EPICTER registry showed that advanced heart failure was associated with older patients and with comorbidities.[7] Palliative care specialists were consulted in only a minority of patients. Hence, the current study was proposed, focused on very elderly patients with the idea of investigating the differences in clinical features, procedures and therapy during admission, and mortality at 6 months in very old and younger patients. We also aimed to determine the predictors of mortality at 6 months in this group of patients.

METHODS

Study Population

This study is a secondary analysis of patients included in the EPICTER project, previously described.[7] It was a multicentre, prospective, nationwide registry that consecutively collected patients admitted for acute HF in 74 Spanish hospitals. Briefly, all patients admitted for acute HF in any hospital department (Internal Medicine, Cardiology, Intensive Care, Palliative Care, and others) were collected at 2 periods during 2016. Inclusion criteria were: (1) age older than 18 years, (2) admission to the hospital room before 8:00 am on the day of data collection, (3) HF as the main cause of admission, including acute HF, acute pulmonary edema, acute coronary syndrome Killip III-IV, or cardiogenic shock. Exclusion criteria were (1) patients who attended the Emergency Department but were not yet admitted, and (2) patients who did not sign the informed consent. The EPICTER study was a project initially focused on advanced HF and palliative care. That is why a follow-up period of 6 months was chosen, since that is the average survival of a patient with end-stage disease. After the follow-up period, the vital status of the patients, as well as the number of readmissions and visits to the emergency room, were recorded by the researchers at each center. For this purpose, they contacted the patient or their relatives and reviewed local health databases.

Patients in the EPICTER registry were collected in 2 phases, but data on the treatment and procedures performed during admission were only available for patients in the second phase. That is why for the current sub-analysis only these were included (see the flow-chart shown in Figure 1).

Study Variables and Endpoint

Age, sex, comorbidities, laboratory data, functional class, symptoms, and treatment during admission were collected. It was also collected if the patient had more than 3 visits to the emergency room in the 6 months before admission and if their estimated survival by their doctor was greater or less than 6 months. Anemia was defined as hemoglobin levels below 12 g/dl in both men and women. Renal disease was defined as an estimated glomerular filtration rate lower than 60 mL/min per 1.73 m^2. The main outcome was the all-cause mortality at 6 months.

Statistical Analysis

Patients were classified into 2 groups according to age: less than 85 years old or 85 years and over. Continuous variables were expressed as mean (95% CI) or median (with 25^{th} to 75^{th} interquartile range), depending on the normality of their distribution. Categorical variables were expressed as frequencies and percentages. Continuous variables were compared using the Student's *t* test or the non-parametric *U*-Mann Whitney test. Categorical variables were compared using the Chi-square

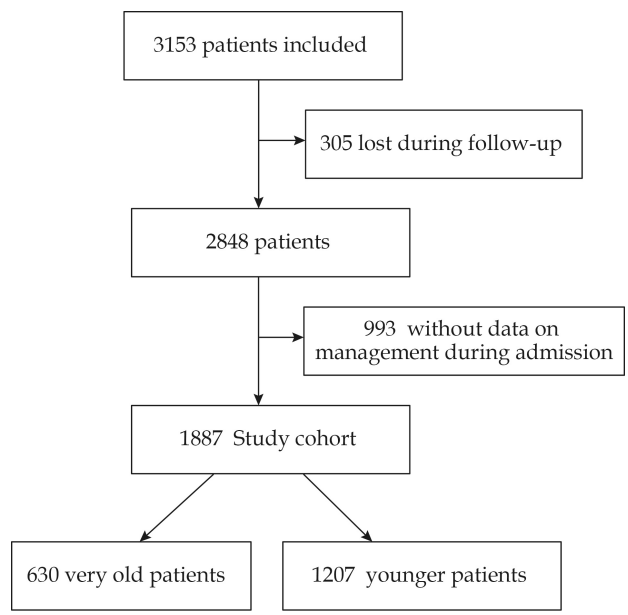

Figure 1 Study flowchart.

or Fisher's exact test.

Mortality in the two groups based on age was first explored using Kaplan-Meier curves and long-rank tests. Associations between all-cause death and comorbidities and treatments during admission were estimated in a multivariable Cox regression model that included age, sex, baseline New York Heart Association (NYHA) class, Left Ventricular Ejection Fraction (LVEF), and other variables. It was expressed as a hazard ratio (HR) with 95% CI.

Statistical significance was considered a $P < 0.05$. All analyses were performed with the IBM Corp. Released 2015, SPSS Statistics for Windows, Version 23.0. Armonk, NY: IMB Corp, Licensed by the University of Seville.

Ethical aspects

The study was carried out in accordance with the Declaration of Helsinki. This study was approved by the Clinical Research Ethics Committee of the Virgen Macarena University Hospital of Seville, Spain (Code 0942-N-15; 24 November 2015). An informed consent was obtained from all participating subjects.

RESULTS

Characteristics of the Population According to the Age

A total of 1887 patients were included in the analysis; they had a mean age of 79 years and 52% were women. Of these, 680 patients (36% of the entire cohort) were 85 years or older.

In the group of very old patients, there was a lower proportion of some comorbidities such as previous acute myocardial infarction, diabetes mellitus, or chronic obstructive pulmonary disease. However, these patients more frequently had arterial hypertension and cerebrovascular disease, and more often they were women. There were no differences in symptoms by age group except for delirium which were significantly more frequent in very old patients (20.6 vs. 12.7%, $P < 0.001$). Very old patients were preferably admitted to Internal Medicine services (86.9%). Regarding treatment, very old patients were treated more frequently with vasodilators, but less often with amines and noninvasive mechanical ventilation (NIMV). Treatment with benzodiazepines was less frequent in the very elderly, and phenothiazine treatment was more common. Regarding non-pharmacological management, in very old patients there were more do-not-resuscitate orders, more withdrawal of treatments, and more consultations with specialized palliative care. The characteristics of the overall cohort and the age groups are shown in Table 1.

Endpoint and Causes of Mortality

At the end of the 6-month follow-up, 40.8% of the patients aged 85 or over had died, compared to 25.4% of the

Table 1 Clinical characteristics of the population study.

Parameters	Study cohort			
	All patients (n = 1887, 100%)	Very old (n = 680, 36%)	Non very old (n = 1207, 64%)	P-value
Clinical examination findings				
Age, yrs	79.5 ± 10.7	89.4 ± 3.7	74.0 ± 9.3	< 0.001
Female gender	984 (52.1%)	420 (61.8%)	564 (46.7%)	< 0.001
SBP, mmHg	126 ± 23	127 ± 24	125 ± 22	0.076
Cardiac comorbidities				
Previous MI	630 (33.9%)	200 (30.0%)	430 (36.0%)	0.009
Previous heart failure	1392 (74.7%)	506 (75.3%)	886 (74.3%)	0.644
Valvular disease	828 (46.0%)	292 (46.1%)	536 (45.9%)	0.959
Other comorbid conditions				
Diabetes	852 (45.4%)	246 (36.4%)	606 (50.5%)	< 0.001
Hypertension	1621 (86.3%)	598 (88.3%)	1023 (85.0%)	0.038
COPD	493 (26.7%)	142 (21.2%)	351 (29.8%)	< 0.001
Cerebrovascular disease	417 (22.5%)	171 (25.5%)	246 (20.8%)	0.019
Peripheral artery disease	316 (17.5%)	100 (15.4%)	216 (18.6%)	0.088
Anaemia	942 (50.4%)	330 (50.0%)	604 (50.7%)	0.767

Continued

Parameters	Study cohort			
	All patients (*n* = 1887, 100%)	Very old (*n* = 680, 36%)	Non very old (*n* = 1207, 64%)	*P*-value
Chronic renal disease	926 (49.4%)	355 (52.4%)	571 (47.7%)	0.051
Cancer	298 (16.0%)	104 (15.4%)	194 (16.3%)	0.647
ECG and echocardiographic data				
Atrial fibrillation/flutter	1107 (59.1%)	412 (60.9%)	695 (58.0%)	0.215
LVEF < 40%	422 (24.1%)	86 (14.7%)	336 (28.8%)	< 0.001
Symptoms				
Dypsnea	1475 (78.9%)	536 (80.0%)	939 (78.2%)	0.374
Anxiety	615 (32.9%)	219 (32.7%)	396 (33.0%)	0.890
Insomnia	674 (36.1%)	251 (37.5%)	423 (35.3%)	0.316
Chest pain	367 (19.7%)	132 (19.7%)	235 (19.6%)	0.952
Nausea	220 (11.8%)	81 (12.1%)	139 (11.5%)	0.745
Erratic pains	527 (28.2%)	192 (28.8%)	335 (27.9%)	0.372
Delusions	290 (15.5%)	138 (20.6%)	152 (12.7%)	< 0.001
Functional assessment				
Baseline NYHA III-IV class	592 (32.1%)	216 (32.7%)	376 (31.7%)	0.684
>3 ED visits*	486 (35.2%)	176 (37.8%)	310 (33.9%)	0.161
Estimated survival less than 6 months	902 (49.5%)	421 (63.9%)	481 (41.4%)	< 0.001
Specialty of the doctor in charge				
Internal medicine	1391 (73.7%)	591 (86.9%)	800 (66.3%)	
Cardiology	322 (17.1%)	51 (7.5%)	271 (22.4%)	
Palliative care	31 (1.6%)	15 (2.2%)	16 (1.3%)	
Intensive care unit	22 (1.2%)	0 (0.0%)	22 (1.8%)	
Others	121 (6.4%)	22 (3.4%)	98 (8.2%)	< 0.001
Blood test data				
Haemoglobin, mg/dL	11.5 ± 2.1	11.5 ± 1.9	11.5 ± 2.1	0.746
Creatinine, mg/dL	1.5 ± 1.0	1.5 ± 0.9	1.6 ± 1.1	0.076
Sodium, mEq/L	138.1 ± 5.4	138.5 ± 5.8	137.9 ± 5.1	0.019
NT-proBNP, pg/ml	4430(2152–10365)	5631(2611–15529)	3969(1828–9000)	0.007
Treatment for HF during admission				
Furosemide infusions	477 (25.3%)	161 (23.7%)	316 (26.2%)	0.229
Amines	151 (8.0%)	35 (5.1%)	116 (9.6%)	0.001
Vasodilators	324 (17.3%)	133 (19.7%)	191 (16.0%)	0.042
Ultrafiltration	20 (1.1%)	4 (0.6%)	16 (1.3%)	0.133
Non-invasive ventilation	166 (8.8%)	46 (6.7%)	120 (9.9%)	0.019
Vaptans	10 (0.5%)	3 (0.4%)	7 (0.6%)	0.686
Hypertonic saline	29 (1.5%)	9 (1.3%)	20 (1.6%)	0.569
Treatment to control symptoms during admission				
Opioids	489 (25.9%)	193 (28.4%)	296 (24.5%)	0.066
Benzodiazepines	648 (34.3%)	209 (30.7%)	439 (36.4%)	0.013
Phenothiazines	214 (11.3%)	101 (14.8%)	113 (9.3%)	< 0.001
Anticholinergics	58 (3.1%)	25 (3.7%)	33 (2.7%)	0.252
Procedures during admission				
Urinary catheter	912 (48.0%)	326 (48.9%)	586 (48.7%)	0.935
Central catheter	233 (12.4%)	47 (7.0%)	186 (15.5%)	< 0.001
Long-term central venous access device	193 (10.3%)	85 (12.8%)	108 (9.0%)	0.010

Continued

Parameters	Study cohort			
	All patients (*n* = 1887, 100%)	Very old (*n* = 680, 36%)	Non very old (*n* = 1207, 64%)	*P*-value
Angiography	229 (12.2%)	47 (7.0%)	182 (15.1%)	< 0.001
Complications				
Pressure ulcers	261 (14.0%)	104 (15.6%)	157 (13.1%)	0.129
Immobilization	395 (21.1%)	166 (24.9%)	229 (19.1%)	0.003
Need for enteral nutrition	88 (4.7%)	23 (3.4%)	65 (5.4%)	0.056
Polypharmacy	1537 (82.5%)	548 (82.6%)	989 (82.5%)	0.927
Management				
Privacy	675 (36.1%)	278 (41.7%)	397 (33.0%)	< 0.001
Spiritual care	185 (9.9%)	77 (11.6%)	108 (9.0%)	0.072
Withdrawal of treatments	287 (15.4%)	133 (20.0%)	154 (12.8%)	< 0.001
Do not resuscitate order	539 (28.8%)	260 (39.0%)	279 (23.2%)	< 0.001
Specialized palliative care	146 (7.8%)	65 (9.8%)	81 (6.7%)	0.020
Mortality				
All-cause mortality at 6 months	573 (30.9%)	271 (40.8%)	302 (25.4%)	< 0.001

Data are presented as *n* (%), mean ± SD or median (1st quartile-3rd quartile). COPD: chronic obstructive pulmonary disease; ED: emergency department; LVEF: left ventricular ejection fraction; MI: myocardial infarction; NT-proBNP: N-terminal pro-brain natriuretic peptide; NYHA: New York heart association; SBP: systolic blood pressure. *More than three Emergency department visits within the past six months.

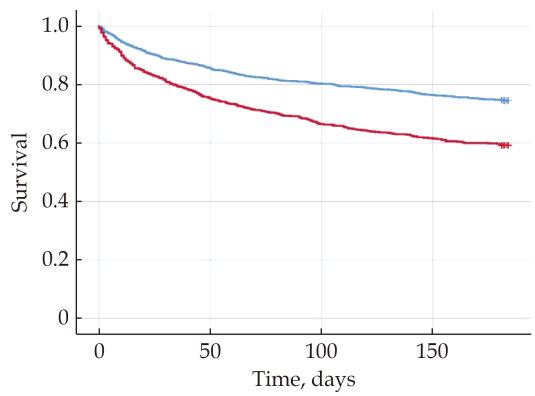

Figure 2 Kaplan-Meier curves for 6-month mortality according to age groups (blue line: non very old patients, red line: very old patients, log-rank P &0.001).

younger ones. Figure 2 shows the Kaplan Meier curves for 6-month mortality according to age groups (log-rank, $P < 0.001$). There were no differences in terms of causes of mortality, except in "other causes", more frequent in younger patients (Table 2). Both very old and very young patients died more frequently in the first two months of follow-up, regardless of the mode of death. Figure 3 details the mortality percentages according to modes of death by months of follow-up.

Predictive Factors of Mortality

The multivariate analysis was adjusted by age, sex, comorbidities, symptoms, baseline NYHA and LVEF. In very old patients, delirium (adjusted HR = 1.88, 95% CI: 1.28–2.76), chronic obstructive pulmonary disease (COPD) (adjusted HR = 1.58, 95% CI: 1.09–2.27) and peripheral arterial disease (adjusted HR = 1.59, 95% CI: 1.05–2.40), and a predicted survival of less than 6 months (adjusted HR = 1.66, 95% CI: 1.12–2.46) were independent factors for 6-month mortality. For the youngest patients, after adjustment, the variables that proved to be predictors of mortality were age, systolic blood pressure, the presence of cancer, and estimated survival of less than 6 months. The analysis is detailed in Table 3.

DISCUSSION

In our cohort of patients admitted for HF, patients ≥ 85 years of age were more frequently women with comorbidities such as hypertension and cerebrovascular disease and had more delirium during admission. Overall, these patients were managed more conservatively than the younger ones, with less intensive treatment for their HF and fewer aggressive procedures. Mortality at 6 months was significantly higher in very old patients. Estimated vital survival of less than 6 months, the presence of COPD and peripheral arterial disease, and the appearance of delirium were independent predictors of mortality.

Table 2 Modes of death.

Modes of death	All patients (*n* = 573)	Very old (*n* = 271)	Non very old (*n* = 302)	*P*-value
Cardiovascular death	357 (62.3%)	177 (65.2%)	180 (59.7%)	0.159
Cardiac sudden death	25 (4.4%)	13 (4.8%)	12 (4.0%)	0.630
Refractory heart failure	286 (50.0%)	141 (52.0%)	145 (48.0%)	0.337
Acute myocardial infarction	14 (2.4%)	7 (2.6%)	7 (2.3%)	0.837
Stroke	11 (1.9%)	5 (1.8%)	6 (2.0%)	0.902
Pulmonary embolism	2 (0.3%)	2 (0.7%)	0	0.135
Aortic aneurysm	1 (0.2%)	0 (0.0%)	1 (0.4%)	0.343
After surgery	4 (0.7%)	0 (0.0%)	4 (1.3%)	0.057
Other cardiovascular causes	14 (2.4%)	9 (3.3%)	5 (1.7%)	0.197
Non-cardiovascular death	202 (35.2%)	85 (31.3%)	117 (38.7%)	0.065
Cancer	27 (4.7%)	10 (3.7%)	17 (5.6%)	0.274
Infection	113 (19.7%)	54 (19.9%)	59 (19.5%)	0.907
Other non-cardiovascular causes	62 (10.8%)	21 (7.7%)	41 (13.6%)	**0.025**
Unknown	14 (2.4%)	9 (3.3%)	5 (1.7%)	0.197

Data are presented as *n* (%).

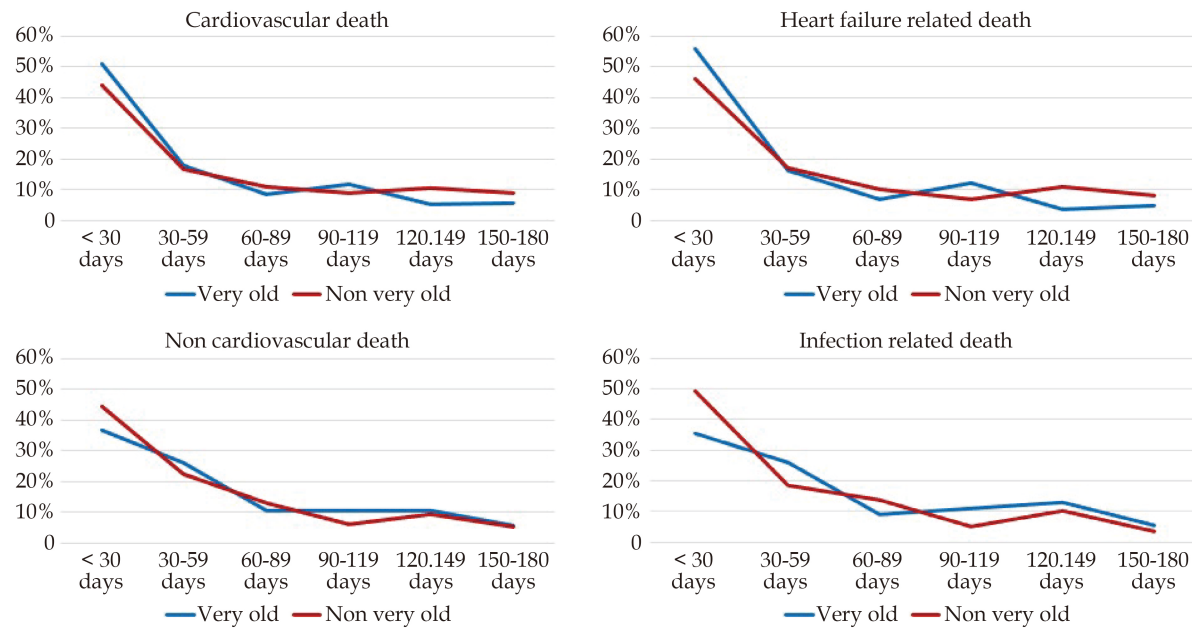

Figure 3 Mortality according to modes of death by months of follow-up.

Advances in disease-modifying treatment of HF as well as device implantation have managed to improve patient survival. Thus, patients admitted to hospital for decompensated HF are increasingly elderly and with multiple pathologies. As in previous works,[4–6] the very elderly patient profile admitted for HF in our study usually suffers from arterial hypertension, is more frequently female, and has preserved LVEF. Since very elderly patients are systematically excluded from clinical trials, Clinical Practice Guidelines do not give clear guidelines on how to treat them.[2–3] However, very old patients are pathophysiologically different from younger ones, they have different tolerance to medication, more comorbidities, frailty, disability, longer recovery time,

Table 3 Factors related to 6-month survival by age group (univariate and multivariate analysis).

Characteristics	Non-very old (< 85 years) (*n* = 1207, 70%)		Very old (≥ 85 years) (*n* = 680, 30%)	
	Univariate analysis HR (95%CI) *P*-value	Multivariate analysis HR (95%CI) *P*-value	Univariate analysis HR (95%CI) *P*-value	Multivariate analysis HR (95%CI) *P*-value
Age, yrs	1.04 (1.03–1.06) **< 0.001**	1.04 (1.02–1.05) **< 0.001**	1.02 (0.99–1.06) 0.149	
Female gender, %	0.84 (0.67–1.05) 0.122		0.91 (0.71–1.16) 0.434	
SBP, mmHg	0.99 (0.98-0.99) **< 0.001**	0.99 (0.98-0.99) **< 0.001**	0.99 (0.98-0.99) **0.002**	0.99 (0.99–1.01) 0.219
Previous MI	1.16 (0.92–1.47) 0.202		1.03 (0.79–1.34) 0.824	
Previous heart failure	1.93 (1.42–2.63) **< 0.001**	1.06 (0.71–1.57) 0.787	1.48 (1.09–2.00) **0.011**	1.03 (0.68–1.57) 0.886
Valvular disease	1.11 (0.88–1.40) 0.367		1.01 (0.79–1.29) 0.950	
Diabetes	1.16 (0.92–1.45) 0.211		1.00 (0.79–1.28) 0.978	
Hypertension	1.23 (0.88–1.73) 0.221		0.92 (0.63–1.33) 0.645	
COPD	1.35 (1.06–1.71) **0.015**	1.18 (0.88–1.59) 0.273	1.38 (1.05–1.82) **0.022**	1.58 (1.09–2.27) **0.015**
Cerebrovascular disease	1.23 (0.94–1.60) 0.135		1.51 (1.17–1.96) **0.002**	1.26 (0.88–1.81) 0.212
Peripheral artery disease	1.09 (0.82–1.44) 0.568		1.40 (1.03–1.92) **0.034**	1.59 (1.05–2.40) **0.028**
Anaemia	1.30 (1.04–1.64) **0.024**	1.02 (0.99–1.82) 0.883	1.28 (1.01–1.63) **0.044**	0.99 (0.71–1.37) 0.930
Chronic renal disease	1.84 (1.46–2.32) **< 0.001**	1.35 (0.99–1.82) 0.055	1.13 (0.89–1.44) 0.310	
Cancer	1.48 (1.12–1.96) **0.006**	1.80 (1.27–2.55) **0.001**	1.02 (0.74–1.42) 0.889	
Atrial fibrillation/flutter	0.99 (0.79–1.24) 0.909		1.08 (0.84–1.38) 0.549	
LVEF <40%	0.91 (0.72–1.15) 0.428		0.86 (0.64–1.15) 0.307	
Dyspnoea	1.76 (1.27–2.42) **0.001**	1.02 (0.69–1.50) 0.922	1.35 (0.98–1.86) 0.063	
Anxiety	1.46 (1.16–1.83) **0.001**	0.94 (0.67–1.31) 0.700	1.74 (1.36–2.22) **< 0.001**	1.27 (0.86–1.88) 0.221
Insomnia	1.25 (0.99–1.57) 0.057		1.30 (1.02–1.65) **0.037**	0.79 (0.53–1.18) 0.248
Chest pain	1.14 (0.86–1.50) 0.368		0.80 (0.59–1.11) 0.179	
Nausea	1.34 (0.97–1.85) 0.073		0.85 (0.57–1.27) 0.422	
Erratic pains	1.36 (1.07–1.73) **0.012**	0.88 (0.64–1.21) 0.420	0.96 (0.74–1.26) 0.779	
Delirium	2.21 (1.68–2.91) **< 0.001**	1.04 (0.70-1.54) 0.853	2.12 (1.64–2.65) **< 0.001**	1.88 (1.28–2.76) **0.001**
Baseline NYHA III-IV class	1.87 (1.48–2.35) **< 0.001**	1.13 (0.81–1.57) 0.471	1.29 (1.01–1.66) **< 0.001**	1.05 (0.74–1.48) 0.798
>3 ED visits*	2.18 (1.66–2.85) **< 0.001**	1.17 (0.83–1.63) 0.371	1.37 (1.06–1.76) **0.015**	1.23 (0.84–1.78) 0.285
Estimated survival less than 6 months	3.79 (2.96–4.85) **< 0.001**	3.12 (2.23–4.37) **< 0.001**	2.08 (1.57–2.75) **< 0.001**	1.66 (1.12–2.46) **0.011**

Continued

Characteristics	Non-very old (< 85 years) (*n* = 1207, 70%)		Very old (≥ 85 years) (*n* = 680, 30%)	
	Univariate analysis HR (95%CI) *P*-value	Multivariate analysis HR (95%CI) *P*-value	Univariate analysis HR (95%CI) *P*-value	Multivariate analysis HR (95%CI) *P*-value
Sodium, mEq/L	0.98 (0.96–1.00) 0.051		0.99 (0.97–1.02) 0.582	
Furosemide infusions	1.26 (0.99–1.61) 0.065		1.26 (0.96–1.66) 0.090	
Amines	0.60 (0.43-0.83) **0.002**	1.11 (0.74–1.67) 0.597	1.34 (0.80-2.26) 0.271	
Vasodilators	1.00 (0.74–1.36) 0.994		0.89 (0.66–1.22) 0.478	
Ultrafiltration	2.10 (0.99–4.44) 0.052		0.61 (0.08–4.32) 0.617	
Non-invasive ventilation	1.32 (0.93–1.86) 0.118		1.16 (0.73–1.85) 0.533	
Vaptans	2.19 (0.70-6.84) 0.176		3.31 (0.82–13.32) 0.092	
Hypertonic saline	1.45 (0.69–3.07) 0.330		2.59 (1.15–5.82) **0.021**	0.98 (0.23–2.45) 0.984

*More than three Emergency department visits within the past six months. COPD: chronic obstructive pulmonary disease, ED: emergency department, LVEF: left ventricular ejection fraction, MI: myocardial infarction, NT-proBNP: N-terminal pro-brain natriuretic peptide, NYHA: New York heart association, SBP: systolic blood pressure.

and higher readmissions and mortality.[8] In very elderly patients, adequate symptom control should be prioritized over improved survival. Not surprisingly, our patients received fewer amines and noninvasive mechanical ventilation, or underwent fewer angiographies, as in other reports.[9] The high rate of hypertension among them could justify a greater use of vasodilators. These drugs have not shown an improvement in survival[10-11] and should be used with caution in the elderly since they are more sensitive to hypotension, but they are a treatment option even in advanced age. Regarding symptom control, the lower use of benzodiazepines in older patients is not surprising either. Although there are studies that have shown its safety in patients admitted for acute HF,[12] its side effects such as falls, and cognitive impairment are well known. The use of neuroleptics in selected patients as well as avoiding unnecessary procedures and catheters are recommended in patients with delirium, a very common symptom in ours and other cohorts.[13] Logically, deprescribing medication could be an appropriate management in elderly patients, especially considering the high rates of polypharmacy in patients with HF.[14–16] All these findings reinforce the idea that in-hospital management of very elderly patients with HF should be individualized depending on the patient's situation, cardiac pathology, and geriatric assessment.[8] Palliative care specialists, whose evaluation was more common in very elderly patients, could assist in the adequacy of therapeutic effort, avoid unnecessary procedures, and improve control of symptoms.

On the other hand, to identify patients with a poor prognosis during admission who could be eligible for palliative care, it is important to know the factors associated with increased mortality. Several studies have shown an increase in mortality in patients with HF and advanced age,[3–6,17–18] but the factors that predict mortality are very heterogeneous. The presence of other concomitant diseases such as diabetes,[4,19] stroke,[5,19] or cancer[5,19] is one of the factors that worsens the prognosis. In our study, peripheral arterial disease and COPD were independent predictors of 6-month mortality in the very elderly. Both pathologies have shown a strong association with poor in-hospital and short-term prognosis in patients admitted for HF.[19–22] Therefore, in very elderly patients, emphasis should be placed on the comorbidities they present, since they can help to adapt treatment and decision-making. Another of the factors that in our study was related to mortality was the presence of delirium. This symptom, very common in hospitalized elderly patients, regardless of the cause, is a well-known marker of early mortality.[13,23] Finally, the role of estimated survival of less than 6 months at the discretion of the physician treating the patient is especially noteworthy. In our cohort, it was the only factor associated with mortal-

ity in both very old and younger patients. Although it has the limitation of being a subjective parameter, other studies carried out in patients with HF have shown that it could play a role in predicting a poor prognosis in these patients.[24–25]

The patients included in our work are representative of those admitted for HF since our real-life cohort is multicenter and has a large sample size. However, the study also has limitations that are important to emphasize. This is a retrospective study that was not specifically designed to assess differences between very old and younger patients. Furthermore, although the patients were followed up for 6 months, no difference was made between in-hospital mortality and death after discharge. Some patients did not have follow-up data and were not included in the analysis. Finally, some factors influence the prognosis of patients with HF, such as nutritional status and frailty, which have not been considered in our study.

In conclusion, very old patients admitted for HF differ from younger ones in comorbidities, management, and symptoms, and have higher mortality. The presence of symptoms such as delirium and pathologies such as peripheral arterial disease and COPD worsens the prognosis in these patients and can help to adapt the therapeutic effort and place emphasis on adequate symptom control.

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