

## Galician Study of Heart Failure in Primary Care (GALICAP Study)

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**Introduction and objectives.** Heart failure (HF) is an important public health concern. Our aim was to evaluate the characteristics of HF patients in Galicia, Spain.

**Methods.** This descriptive, cross-sectional, multicenter study involved 149 primary care physicians and recorded the characteristics of 1195 patients diagnosed with HF.

**Results.** Some 48% of patients were male, and their mean age was 76 years, though women were older ( $P < .001$ ). Disease history included hypertension in 82%, hyperlipidemia in 47%, diabetes in 31%, atrial fibrillation in 49%, valvular disease in 35%, and ischemic heart disease in 32%. Mean systolic and diastolic blood pressures were 131 mm Hg and 76 mm Hg, respectively and was controlled ( $\leq 130/80$  mm Hg) in 43% of patients. Overall, 67% underwent echocardiography, of whom 61% had preserved systolic function. Coronary angiography was performed in 47% of patients with ischemic heart disease, more frequently in males than females ( $P < .001$ ). The most commonly prescribed drugs were diuretics (82%), angiotensin-converting enzyme (ACE) inhibitors (48%), angiotensin II receptor antagonists (29%), and beta-blockers (27%). Patients with depressed systolic function were more frequently prescribed beta-blockers ( $P < .001$ ), ACE inhibitors ( $P < .01$ ), and antialdosterones ( $P < .05$ ). During the last year, 57% of patients had been admitted to hospital, of whom 45% were admitted for cardiovascular reasons.

**Conclusions.** The most prevalent form of HF in Galicia was HF with preserved systolic function, which was mostly associated with high blood pressure due to poor control. In patients with ischemic heart disease, the use of coronary angiography was influenced by sex. Drug treatment was suboptimal. Intervention programs are required to improve care in these patients.

**Key words:** Heart failure. Primary care. Epidemiology. Treatment.

### Estudio gallego de insuficiencia cardiaca en atención primaria (estudio GALICAP)

**Introducción y objetivos.** La insuficiencia cardiaca (IC) es un importante problema de salud en nuestro medio. Pretendemos conocer las características de estos pacientes en Galicia.

**Métodos.** Estudio descriptivo, transversal, multicéntrico con la participación de 149 médicos de atención primaria, en el que se registraron las características de 1.195 pacientes diagnosticados de IC.

**Resultados.** Un 48% de los pacientes eran varones con una edad media de 76 años, mayor en mujeres ( $p < 0,001$ ). Presentaba antecedentes de hipertensión el 82%, de dislipidemia el 47%, de diabetes el 31%, de fibrilación auricular el 49%, de valvulopatía el 35% y de cardiopatía isquémica el 32%. Los valores medios de presión arterial sistólica y diastólica fueron, respectivamente, 131 y 76 mmHg, y estaban controlados ( $\leq 130/80$  mmHg) en el 43% de pacientes. El 67% tiene un ecocardiograma, el 61% de ellos con una función sistólica preservada. Al 47% de los pacientes con IC se les realizó una coronariografía, porcentaje superior ( $p < 0,001$ ) en varones. Los fármacos más prescritos fueron diuréticos (82%), inhibidores de la enzima de conversión de la angiotensina (IECA) (48%),

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antagonistas de los receptores de la angiotensina II (29%) y bloqueadores beta (27%). En los pacientes con función sistólica deprimida se prescriben más bloqueadores beta ( $p < 0,001$ ), IECA ( $p < 0,01$ ) y antialdosterónicos ( $p < 0,05$ ). Durante el último año, el 57% de los pacientes estuvieron ingresados, el 45% de ellos por causa cardiovascular.

**Conclusiones.** La IC con función sistólica preservada es la forma más prevalente en Galicia, que está mayoritariamente asociada con una presión arterial elevada siendo, su control limitado. En pacientes con cardiopatía isquémica, el sexo influye en la realización de coronariografía. La prescripción de fármacos no es óptima. Es necesario promover estrategias para mejorar el cuidado de estos pacientes.

**Palabras clave:** *Insuficiencia cardíaca. Atención primaria. Epidemiología. Tratamiento.*

#### ABBREVIATIONS

ACE: angiotensin converting enzyme  
AII: angiotensin II  
HF: heart failure  
LVEF: left ventricular ejection fraction

## INTRODUCTION

Heart failure (HF) represents the end-stage of most types of heart disease. This circumstance, together with the aging of the population and advances in the treatments of ischemic and hypertensive heart disease, has led to an increase in its prevalence year after year, making it one of the most important health problems in Western countries.<sup>1</sup>

In Spain, it affects 10% of the population over 70 years of age, is the third leading cause of death<sup>3</sup> and is the leading cause of hospital admission in individuals over the age of 65, with a three-month readmission rate that, in some cases, has been estimated to be over 50%.<sup>4,6</sup> In addition, it is the disease into which the highest proportion of resources is channeled.<sup>2,7,8</sup>

There are data that indicate a change in the profile of Spanish HF patients, who would be older, with a higher incidence of ischemic heart disease, as well as an increase in the incidence of HF with preserved systolic function. Nearly all the available studies include patients who are either hospitalized or are being followed by specialists in the hospital setting; there are very few community-based studies and, in many cases, the correct diagnosis of HF could even be placed in doubt.

The GALICAP study was designed for the purpose of establishing the epidemiological, clinical and therapeutic

characteristics of patients diagnosed as having HF being followed in the primary care centers of Galicia, in northwestern Spain.

## METHODS

### Study Protocol

The study was carried out by 149 primary care physicians, distributed in eight areas, according to the population, to ensure a representative sample of Galicia. They were asked to enroll all their patients who met the inclusion criteria: those who had been in the hospital (either admitted or in the emergency service for at least 24 hours) and had a diagnosis of HF in the discharge summary. We included ambulatory patients who had a hospital diagnosis of HF.

After obtaining informed consent, 73% of the investigators included between six and 10 patients, with a mean of eight per physician and a total of 1195. After data collection, an internal audit was carried out to guarantee their quality.

### Variables Analyzed

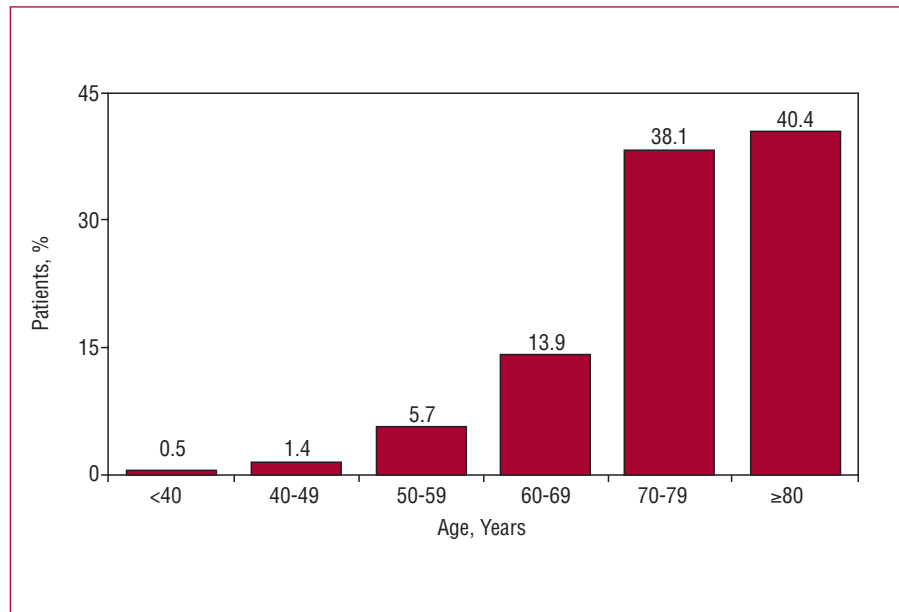
The investigators recorded the demographic, anthropometric, and clinical characteristics, analytical data, results of diagnostic studies, therapeutic approaches, and hospital admissions over the 12 months prior to the inclusion of a patient. Physical examination, electrocardiogram, and laboratory tests were performed during the enrollment visit.

Hypertensive patients were considered to be those with a history of hypertension, and controlled hypertension was defined as blood pressure below 130/80 mm Hg.<sup>9</sup> The most recent echocardiographic and coronary angiography data were collected from the medical records, and the treatment being prescribed at the time of enrollment was recorded.

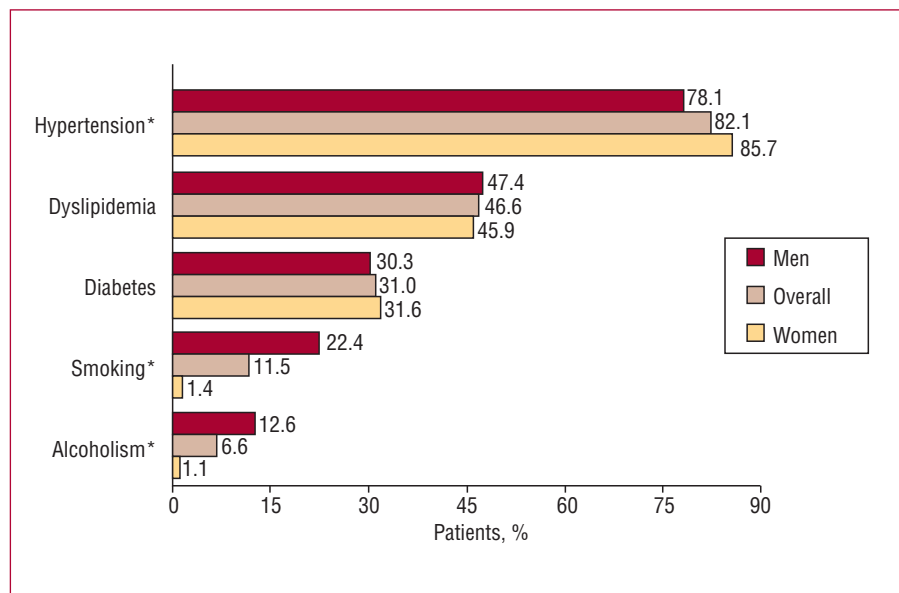
To determine the etiology, the following criteria were considered: ischemic when the patient was diagnosed as having ischemic heart disease; valvular when the patient had previously been diagnosed with at least moderate valve disease, in the absence of ischemic heart disease; hypertensive in hypertensive patients with no other evidence of significant heart disease; and idiopathic dilated cardiomyopathy when the patient had a left ventricular ejection fraction (LVEF) less than 50%, in the absence of any other heart disease. Systolic function in HF was considered to be preserved when the LVEF was greater than or equal to 50% and depressed when it was lower.<sup>10</sup>

### Statistical Analysis

In this cross-sectional, descriptive study, corresponding to the first phase of the GALICAP study, the qualitative



**Figure 1.** Patients enrolled in the GALICAP study: distribution according to age group.



**Figure 2.** Cardiovascular risk factors in the patients enrolled in the GALICAP study: distribution according to sex. \* $P < .001$ .

variables are expressed as absolute numbers of cases and percentages, and the quantitative variables are expressed as the mean (standard deviation). The statistical study was carried out using the SPSS software package (version 11.5) for Windows. A descriptive statistical analysis of the categorical variables, based on frequency tables, was performed using Pearson's  $\chi^2$  test to compare the significance of the association between qualitative variables. Student  $t$  test for independent samples was employed to compare the means of the different groups. A  $P$  value less than .05 was considered significant.

## RESULTS

### Clinical Characteristics of the Patient Population: Influence of Sex and the Pattern of Ventricular Dysfunction

A total of 1195 patients were included (48% men). The mean age was 76 (10) years and was significantly older in women, 40% of whom were over 80 years of age (Figure 1). The mean body mass index, also higher among women, was 29.0 (5.0); this index was indicative

**TABLE 1. History and Associated Diseases of the Patients enrolled in the GALICAP Study: Distribution According to Sex\***

	Total 1195 (100%)	Men 572 (47.9%)	Women 623 (52.1%)	P
Ischemic heart disease, n (%)	380 (31.8)	211 (36.9)	169 (27.1)	<.001
Myocardial infarction, n (%)	217 (18.2)	131 (23.0)	86 (13.8)	<.001
Revascularization, n (%)	84 (7.0)	54 (9.4)	30 (4.8)	<.01
Atrial fibrillation, n (%)	583 (48.8)	256 (44.8)	327 (52.5)	<.01
Valve disease, n (%)	422 (35.3)	177 (31.0)	245 (39.3)	<.01
Syncope, n (%)	97 (8.1)	42 (7.3)	55 (8.9)	NS
Pacemaker, n (%)	102 (8.5)	56 (9.8)	46 (7.4)	NS
Abdominal aneurysm, n (%)	12 (1.0)	10 (1.8)	2 (0.3)	<.05
Stroke, n (%)	131 (11.0)	69 (12.1)	62 (9.9)	NS
Peripheral vascular disease, n (%)	131 (11.0)	81 (14.1)	50 (8.0)	<.01
Renal failure, n (%)	161 (13.5)	79 (13.9)	82 (13.2)	NS
COPD, n (%)	332 (27.8)	198 (34.6)	134 (21.5)	<.001
Hospital admissions during the preceding year				
Total, n (%)	675 (56.5)	337 (58.9)	338 (54.3)	NS
Cardiovascular causes, n (%)	537 (44.9)	272 (47.5)	265 (42.5)	NS
Heart failure, n (%)	379 (31.7)	179 (31.3)	200 (32.1)	NS

\*COPD indicates chronic obstructive pulmonary disease; NS, not significant.  
Renal failure, according to data collected from medical records.

**TABLE 2. Clinical Characteristics of the Patients Enrolled in the GALICAP Study: Distribution According to Sex\***

	Total 1195 (100%)	Men 572 (47.9%)	Women 623 (52.1%)	P
Age, mean (SD), years	76 (10)	73 (11)	78 (10)	<.001
Weight, mean (SD), kg	74.6 (14.0)	78.8 (13.4)	70.8 (13.5)	<.001
Height, mean (SD), cm	160.3 (9.2)	166.0 (7.3)	155.0 (7.6)	<.001
Abdominal circumference, mean (SD), cm	97.6 (14.2)	100.2 (13.6)	95.3 (14.5)	<.001
BMI, mean (SD)	29.0 (5.0)	28.6 (4.5)	29.4 (5.5)	<.01
<20, n (%)	18 (1.5)	9 (1.6)	9 (1.5)	
20-25, n (%)	214 (17.9)	97 (17.0)	117 (18.8)	
25-30, n (%)	522 (43.7)	285 (49.8)	237 (38.0)	<.01
>30, n (%)	441 (36.9)	181 (31.6)	260 (41.7)	
Systolic AP, mean (SD), mm Hg	131 (18)	130 (18)	133 (17)	<.01
Diastolic AP, mean (SD), mm Hg	76 (11)	75 (11)	76 (11)	NS
Hypertension, n (%)	981 (82.1)	447 (78.1)	534 (85.7)	<.001
Controlled AP, n (%)	419 (42.7)	191 (42.7)	228 (42.7)	NS
Diabetes mellitus, n (%)	370 (31.0)	173 (30.3)	197 (31.6)	NS
LL edemas, n (%)	423 (35.4)	188 (32.8)	235 (37.7)	<.05
Anemia, n (%)	290 (24.3)	158 (27.7)	132 (21.2)	<.01
Renal failure, n (%)	750 (62.8)	281 (49.1)	469 (75.3)	<.001
Atrial fibrillation	583 (48.8)	256 (44.8)	327 (52.5)	<.01
NYHA functional class, n (%)				
I	221 (18.5)	122 (21.3)	99 (15.9)	
II	574 (48.0)	275 (48.1)	299 (48.0)	<.05
III	343 (28.7)	145 (25.3)	198 (31.8)	
IV	57 (4.8)	30 (5.2)	27 (4.3)	
Etiology, n (%)				
Ischemic	376 (31.5)	210 (36.8)	166 (26.6)	
Hypertensive	428 (35.8)	187 (32.7)	241 (38.7)	
Valvular	293 (24.5)	117 (20.5)	176 (28.3)	<.001
IDCM	18 (1.5)	14 (2.4)	4 (0.6)	
Other	80 (6.7)	44 (7.7)	36 (5.8)	

\*AP indicates arterial pressure; BMI, body mass index; IDCM, idiopathic dilated cardiomyopathy; LL, lower limb; NS, not significant; NYHA, New York Heart Association; SD, standard deviation.  
Renal failure, glomerular filtration rate, calculated according to the Cockcroft-Gault formula, less than 60 mL/min.

**TABLE 3. Clinical Characteristics of the Patients Enrolled in the GALICAP Study Who Underwent Echocardiogram: Distribution in Terms of Left Ventricular Ejection Fraction**

	Total 803 (100%)	LVEF ≥50% 493 (61.4%)	LVEF <50% 310 (38.6%)	P
Age, mean (SD), years	75 (11)	76 (10)	73 (11)	<.001
Female sex, n (%)	399 (49.6)	279 (56.6)	120 (38.7)	<.001
Weight, mean (SD), kg	74.8 (14.0)	74.8 (14.3)	75.1 (13.0)	NS
Height, mean (SD), cm	160.7 (9.2)	159.6 (8.8)	162.9 (9.3)	<.001
Abdominal circumference, mean (SD), cm	96.9 (14.0)	96.5 (14.6)	97.2 (12.4)	NS
BMI, mean (SD)	28.9 (5.0)	29.4 (5.2)	28.2 (4.2)	<.01
<20, n (%)	14 (1.8)	8 (1.6)	6 (1.9)	
20-25, n (%)	132 (16.4)	81 (16.5)	51 (16.5)	
25-30, n (%)	371 (46.2)	206 (41.7)	165 (53.2)	<.05
>30, n (%)	286 (35.6)	198 (40.2)	88 (28.4)	
Systolic AP, mean (SD), mm Hg	131 (18)	131 (17)	129 (19)	NS
Diastolic AP, mean (SD), mm Hg	75 (11)	75 (10)	75 (11)	NS
Hypertension, n (%)	652 (81.2)	406 (82.4)	246 (79.4)	NS
Controlled AP, n (%)	291 (44.6)	173 (42.6)	118 (48.0)	NS
Diabetes mellitus, n (%)	258 (32.1)	159 (32.3)	99 (31.9)	NS
LL edemas, n (%)	259 (33.2)	167 (33.9)	92 (29.7)	NS
Anemia, n (%)	193 (24.0)	119 (24.1)	74 (23.9)	NS
Renal failure, n (%)	496 (61.8)	317 (64.3)	179 (57.7)	<.05
Atrial fibrillation, n (%)	415 (51.7)	288 (58.4)	127 (41.0)	<.001
NYHA functional class, n (%)				
I	143 (17.8)	91 (18.5)	52 (16.8)	
II	376 (46.8)	233 (47.2)	143 (46.1)	
III	241 (30.0)	144 (29.2)	97 (31.3)	NS
IV	43 (5.3)	25 (5.1)	18 (5.8)	
Etiology, n (%)				
Ischemic	296 (36.9)	156 (31.6)	140 (45.2)	
Hypertensive	206 (25.7)	145 (29.4)	61 (19.7)	
Valvular	255 (31.7)	164 (33.3)	91 (29.4)	<.001
IDCM	18 (2.2)	0 (0.0)	18 (5.8)	
Other	28 (3.5)	28 (5.7)	0 (0.0)	
Hospital admissions, n (%)				
Total	463 (57.7)	286 (58.0)	177 (57.1)	NS
Cardiovascular causes	381 (47.5)	228 (46.2)	153 (49.4)	NS
Heart failure	255 (31.8)	153 (31.0)	102 (32.9)	NS

\*AP indicates arterial pressure; BMI, body mass index; IDCM, idiopathic dilated cardiomyopathy; LL, lower limbs; LVEF, left ventricular ejection fraction; NS, not significant; NYHA, New York Heart Association; SD, standard deviation.

Renal failure, glomerular filtration rate, calculated according to the Cockcroft-Gault formula, less than 60 mL/min.

of obesity in 37% of the patients. The majority (89.5%) lived with family members, and only 9.9% had attended a technical school or college.

Nearly half the patients (46.4%) had a history of HF of more than three years and, in 17%, the disease had been diagnosed during the year prior to enrollment. Of these patients, 72% were being treated by cardiologists, 17% by internists or other specialists and the remaining 11% were controlled by their primary care physicians. In 820 cases (69%), the patients visited their general practitioners with a periodicity of no more than one month.

Figure 2 shows the cardiovascular risk factors. The mean number of risk factors per patient was 1.70, and was significantly higher in men (1.81) than in women

(1.60), while 122 patients (10%) presented no risk factors.

The history of cardiovascular disease and associated diseases in the study population, as well as their distribution according to sex, appear in Table 1. In all, 57% of the patients had been hospitalized at least once for some cause during the year prior to enrollment, and 21% had had more than one hospital stay, with a maximum of eight and a mean of 0.91. During that period, 45% of the patients had been admitted for cardiovascular problems and 32% due to HF.

Table 2 shows the clinical characteristics of the patients, according to sex, at the time of enrollment. The characteristics of the study population in terms of systolic function appear in Table 3.

**TABLE 4. Additional Tests Performed in the Patients Enrolled in the GALICAP Study: Distribution According to Sex\***

	Total 1195 (100%)	Men 572 (47.9%)	Women 623 (52.1%)	P
Electrocardiogram, n (%)	1195 (100)	572 (100)	623 (100)	NS
SR/AF, n (%)	555 (46)/583 (49)	279 (49)/263 (46)	276 (44)/320 (51)	NS
LVH, n (%)	318 (26.6)	152 (26.6)	166 (26.6)	NS
Echocardiogram, n (%)	803 (67.2)	404 (70.6)	399 (64.0)	<.050
LVEF <50%, n (%)	310 (38.6)	190 (47.0)	120 (30.1)	<.001
Coronary angiography†, n (%)	175 (46.5)	120 (56.8)	55 (33.1)	<.001
CL ≥50%, n (%)	103 (58.9)	70 (58.3)	33 (60.0)	NS

\*AF indicates atrial fibrillation; CL, coronary lesion, in patients who had undergone catheterization; LVEF, left ventricular ejection fraction, in patients who had undergone echocardiography; LVH, left ventricular hypertrophy; NS, not significant; SR, sinus rhythm.

†In patients with ischemic heart disease.

### Diagnostic Tests Performed and Drug Treatments

Table 4 shows additional tests performed in the study patients.

The treatments at the time of enrollment according to sex appear in Table 5. The mean number of drugs prescribed per patient was 4.3 and the median was 4; the mean was significantly higher in men (4.4) than in women (4.2), who were taking more diuretics and nonsteroidal antiinflammatory drugs, but lesser amounts of angiotensin converting enzyme (ACE) inhibitors, statins and  $\alpha$ -blockers than the men; the percentage of men receiving triple-drug therapy with ACE inhibitors and/or angiotensin II (AII) receptor antagonists,  $\beta$ -blockers and spironolactone was higher among men.

Table 6 shows drug prescription according to patient age. The mean number of drugs prescribed varied according to the New York Heart Association functional class, ranging between 4.1 for class I patients and 4.4 for those in class IV. It was significantly higher in those who underwent an echocardiogram (4.4 vs 3.9) and, of the patients in this group, it was higher among those with depressed systolic function (4.7) than among those in whom systolic function was preserved (4.3).

Table 7 presents the treatment according to the LVEF. Finally, statistically significant differences were observed between the patients treated by cardiologists and those treated by internists: a higher proportion of the former received beta blockers (32% vs 17%), anticoagulants

**TABLE 5. Drug Treatment in Patients Enrolled in the GALICAP Study: Distribution According to Sex\***

	Total 1195 (100%)	Men 572 (47.9%)	Women 623 (52.1%)	P
Diuretics, n (%)	983 (82.3)	456 (79.7)	527 (84.6)	<.05
Loop diuretics, n (%)	755 (63.2)	354 (61.9)	401 (64.4)	NS
Thiazides, n (%)	270 (22.6)	118 (20.7)	152 (24.4)	NS
Calcium antagonists, n (%)	219 (18.3)	102 (17.8)	117 (18.8)	NS
Dihydropyridines, n (%)	126 (10.6)	60 (10.5)	66 (10.6)	NS
Nondihydropyridines, n (%)	94 (7.9)	42 (7.3)	52 (8.3)	NS
ACE inhibitors, n (%)	574 (48.0)	290 (50.7)	284 (45.6)	<.05
AII-RA, n (%)	348 (29.1)	165 (28.9)	183 (29.4)	NS
$\beta$ -blockers, n (%)	320 (26.8)	165 (28.9)	155 (24.9)	NS
$\alpha$ -blockers, n (%)	55 (4.6)	38 (6.6)	17 (2.7)	<.01
Spironolactone, n (%)	196 (16.4)	96 (16.8)	100 (16.0)	NS
Digitalis, n (%)	449 (37.6)	210 (36.8)	239 (38.4)	NS
Nitrates, n (%)	296 (24.8)	149 (26.0)	147 (23.6)	NS
Anticoagulants, n (%)	548 (45.9)	259 (45.2)	289 (43.3)	NS
Aspirin, n (%)	380 (31.8)	196 (34.2)	184 (29.5)	NS
Other antiplatelet drugs, n (%)	111 (9.3)	55 (9.7)	56 (9.0)	NS
Antiarrhythmics, n (%)	94 (7.9)	49 (8.6)	45 (7.2)	NS
Statins, n (%)	519 (43.4)	272 (47.6)	247 (39.6)	<.01
NSAID, n (%)	49 (4.1)	15 (2.7)	34 (5.5)	<.05
AII-RA and/or ACE inhibitors, n (%)	887 (74.2)	438 (76.6)	449 (72.1)	NS
AII-RA and/or ACE inhibitors+ $\beta$ -B, n (%)	231 (19.3)	121 (21.1)	110 (17.7)	NS
AII-RA and/or ACE inhibitors+ $\beta$ -B+SP, n (%)	44 (3.7)	29 (5.1)	15 (2.4)	<.05

\*ACE indicates angiotensin converting enzyme; AII-RA, angiotensin II receptor antagonists;  $\beta$ B,  $\beta$ -blockers; NS, not significant; NSAID, nonsteroidal antiinflammatory drugs; SP, spironolactone

**TABLE 6. Drug Treatment in the Patients Enrolled in the GALICAP Study: Distribution According to Age\***

	Total 1195 (100%)	<70 Years 257 (21.5%)	≥70 Years 938 (78.5%)	P
Diuretics, n (%)	983 (82.3)	185 (72.0)	798 (85.1)	<.001
Loop diuretics, n (%)	755 (63.2)	133 (51.6)	622 (66.3)	<.001
Thiazides, n (%)	270 (22.6)	64 (24.8)	206 (22.0)	NS
Calcium antagonists, n (%)	219 (18.3)	40 (15.6)	179 (19.1)	NS
ACE inhibitors, n (%)	574 (48.0)	121 (47.1)	453 (48.3)	NS
All-RA, n (%)	348 (29.1)	78 (30.4)	270 (28.8)	NS
β-blockers, n (%)	320 (26.8)	107 (41.6)	213 (22.7)	<.001
Digitalis, n (%)	449 (37.6)	81 (31.5)	368 (39.2)	<.050
Nitrates, n (%)	296 (24.8)	47 (18.3)	249 (26.5)	<.050
Anticoagulants, n (%)	548 (45.9)	114 (44.4)	434 (46.3)	NS

\*ACE indicates angiotensin converting enzyme; All-RA, angiotensin II receptor antagonists; NS, not significant.

**TABLE 7. Drug Treatment in the Patients Enrolled in the GALICAP Study Who Underwent Echocardiogram: Distribution According to Left Ventricular Ejection Fraction\***

	Total 803 (67.2%)	LVEF≥50% 493 (61.4%)	LVEF<50% 310 (38.6%)	P
Diuretics, n (%)	659 (82.1)	411 (83.4)	248 (80.0)	NS
Loop diuretics, n (%)	524 (65.3)	318 (64.6)	206 (66.4)	NS
Thiazides, (%)	173 (21.6)	118 (23.9)	55 (17.7)	<.05
Calcium antagonists, n (%)	158 (19.7)	104 (21.0)	54 (17.4)	NS
Dihydropyridines, n (%)	87 (10.8)	58 (11.7)	29 (9.4)	NS
Nondihydropyridines, n (%)	74 (9.2)	48 (9.7)	26 (8.4)	NS
ACE inhibitors, n (%)	420 (52.3)	238 (48.2)	182 (58.7)	<.01
All-RA, n (%)	220 (27.4)	138 (27.9)	82 (26.5)	NS
β-blockers, n (%)	257 (32.0)	124 (25.2)	133 (42.9)	<.001
α-blockers, n (%)	41 (5.1)	25 (5.1)	16 (5.2)	NS
Spironolactone, n (%)	145 (18.1)	77 (15.7)	68 (21.9)	<.05
Digitalis, n (%)	298 (37.1)	171 (34.7)	127 (41.0)	NS
Nitrates, n (%)	200 (24.9)	119 (24.1)	81 (26.1)	NS
Anticoagulants, n (%)	394 (49.1)	268 (54.4)	126 (40.6)	<.001
Aspirin, n (%)	267 (33.3)	148 (30.0)	119 (38.4)	<.05
Other antiplatelet drugs, n (%)	73 (9.1)	36 (7.3)	37 (11.9)	<.05
Antiarrhythmics, n (%)	79 (9.8)	46 (9.3)	33 (10.6)	NS
Statins, n (%)	371 (46.2)	215 (46.2)	156 (50.3)	<.05
NSAID, n (%)	27 (3.4)	19 (3.8)	8 (2.6)	NS
All-RA and/or ACE inhibitors, n (%)	618 (77.0)	355 (72.1)	263 (84.8)	<.001
All-RA and/or ACE inhibitors+β-B, n (%)	197 (24.5)	84 (17.0)	113 (36.5)	<.001
All-RA and/or ACE inhibitors+β-B+SP, n (%)	42 (5.2)	9 (1.8)	33 (10.6)	<.001

\*ACE indicates angiotensin converting enzyme; All-RA, angiotensin II receptor antagonists; βB, β-blockers; LVEF, left ventricular ejection fraction; NS, not significant; NSAID, nonsteroidal antiinflammatory drugs; SP, spironolactone

(50% vs 33%), digoxin (39% vs 30%) and statins (47% vs 38%).

## DISCUSSION

The profile of patients with HF in Galicia is characterized by very advanced age and the predominance of women, and less than 50% of them have a history of this condition of more than three years. It is a disease that requires an elevated consumption of health care resources; the cardiologist is usually the referral specialist and more than half of the patients had required hospital

admission over the preceding year, and the stay was generally directly related to HF.

The prevalence of HF with a normal LVEF is significantly higher than that of HF in which there is deterioration of systolic function, and is associated with more advanced age and a higher prevalence of hypertension, atrial fibrillation, and renal dysfunction.

Although the use of diagnostic resources was significantly greater in men, there were no significant differences in the use of drugs with known prognostic benefits.

To the best of our knowledge, the GALICAP study is the first of its kind to be carried out in Spain, including

patients with a hospital diagnosis of HF (previous admission with said diagnosis) treated by primary care physicians and specialists from all over Galicia.

In addition to contributing to our knowledge of this disease, it enables the development of strategies to achieve more efficient prevention and treatment, in which the coordination between primary care and specialty care should constitute the cornerstone. Interventions of this type have been shown to enhance the quality of life of the patients, as they reduce the need for hospital admissions and increase both the use of drugs with known prognostic benefits and treatment compliance.<sup>11-15</sup>

In this respect, the GALICAP study was designed for the purpose of establishing the features of HF in Galicia and promoting training initiatives for the health care professionals involved, in order to improve the diagnosis, treatment and follow-up of patients and facilitate coordination between health care settings.

Moreover, we consider that initiatives of this type enable the creation of stable HF registries that make it possible to improve health care quality and aid in research and continuing education.

### Clinical Epidemiological Features

The results of the GALICAP study indicate the HF in Galicia affects a population that is characterized by very advanced age, the predominance of women and a high prevalence of hypertension, diabetes mellitus and associated diseases. These findings reveal certain differences in terms of relevance and add to the information provided by previous studies carried out in Spain, which usually include series of hospitalized or hospital-based HF patients.<sup>16-20</sup> These series are generally characterized by younger patients, with a predominance of men and a higher prevalence of ischemic heart disease. For example, in the BADAPIC study, which included 3909 HF patients being treated in 62 HF clinics located all over Spain, the mean age was 66 years, 67% of the patients were men and ischemic heart disease was the etiological determinant in 41%.<sup>18</sup>

The European Study of Ambulatory Management of Heart Failure, carried out by cardiologists, obtained similar results. It included 1252 ambulatory patients diagnosed in three European countries (Spain, France, and Germany), with clinical features very similar to those reported for the BADAPIC study, with the exception of the observation of a prevalence of hypertension similar to that reported by us, which was over 60% in all three countries.<sup>21</sup> This finding could be the result of the greater sample size in the BADAPIC study and the higher survival rate of patients with HF and hypertension as compared to the group with ischemic heart disease, a circumstance that could influence the profile of the ambulatory patient with said disease.

The INCARGAL study included somewhat less than one thousand patients, hospitalized for HF in the

cardiology and internal medicine services of 12 Galician hospitals; although the mean age was older than that reported in the studies mentioned above and similar to that recorded in the GALICAP study, the remainder of the clinical features are very similar to those documented in the hospital-based studies and registries.<sup>19</sup>

There are very few community-based studies of HF in Spain, and those available reveal certain methodological limitations, as well as limitations in the characteristics of data collection since, in addition to failing to indicate the requirements necessary for establishing the diagnosis, the clinical elements analyzed usually do not include the presence of associated diseases, the assessment of renal function, presence of anemia, etc.<sup>22</sup> The CARDIOTENS study, carried out in 1999 by cardiologists and primary care physicians in Spain, included 1420 patients diagnosed as having HF, with a mean age of 71 years, predominance of women and a high prevalence of hypertension,<sup>23</sup> features comparable to those observed in similar studies performed in Portugal (the EPICA study)<sup>24</sup> and in 15 countries belonging to the European Society of Cardiology (the IMPROVEMENT study).<sup>25</sup>

### Pathophysiological Patterns of Heart Failure: Heart Failure With Normal Left Ventricular Ejection Fraction

One of the findings that we consider to be of major relevance in the GALICAP study is the high prevalence of HF with normal LVEF: in 61.4% of the patients who underwent an echocardiographic study, the LVEF was greater than 50%. This is the first time that a study on HF in Spain has reported a higher incidence of HF with normal systolic function than that associated with depressed systolic function, a circumstance that probably indicates a change in the profile of these patients. In many earlier studies, the status of left ventricular systolic function was not systematically reported and, in those in which it was, HF with a reduced ejection fraction always predominated.<sup>16-19</sup> As we have pointed out, 68% of the patients in the BADAPIC study had a LVEF less than 45%, and similar results were observed in hospital-based series, in which cases of HF with depressed systolic function predominated.<sup>18</sup>

As our study indicates, HF with normal systolic function is an increasingly widespread public health problem. Its clinical profile is characterized by more advanced age than in HF secondary to the deterioration of systolic function, female predominance and a high prevalence of hypertension and associated diseases. The mortality rate is high, similar to that observed in systolic heart failure,<sup>26,27</sup> and, in contrast to the latter condition, has not decreased over the past decade.<sup>28,29</sup> It is also associated with considerable morbidity and, at the present time, there is no defined therapeutic strategy.<sup>30,31</sup> These facts indicate the need to concentrate more research on this field, not only to learn more about the disease, but to develop



effective preventive and therapeutic strategies. However, it is probably the paradigm of aging-related disease, and we will inevitably witness a continuous increase in its incidence and prevalence, associated with the increase in the life expectancy of the general population.

### **Influence of Sex on the Clinical Profile of Heart Failure**

Women predominate in community-based studies of HF. This subgroup presents a higher prevalence of hypertension and atrial fibrillation, but a lower incidence of ischemic heart disease; likewise, the number of diagnostic tests performed is lower than in men, as is the prescription of drugs with known prognostic benefits.<sup>32-35</sup> Despite this fact, in the majority of series, the mortality rate is usually lower,<sup>35-37</sup> a finding that may be influenced by a number of factors, especially the lower rate of mortality associated with HF in the absence of clinical evidence of ischemic heart disease.

The results of our study coincide with those of other reports, with the exception of the therapeutic strategy, which was similar in the two groups of patients in terms of the use of drugs that block the renin-angiotensin-aldosterone system and of  $\beta$ -blockers.

### **Therapeutic Strategy**

Therapeutic optimization is one of the major objectives in the provision of health care to patients with HF. It has been shown to prolong life and reduce the need for hospital admissions, improving the quality of life in general.<sup>38</sup> In addition to drug treatment, the correct management of these patients makes it necessary to introduce changes in lifestyle, consider the performance of interventional percutaneous and surgical procedures, employ devices, etc. Simple disease management programs, with the intervention of primary care physicians, specialists and nursing staff, have been shown to have a favorable effect on the therapeutic objectives as a whole.<sup>11-15</sup>

In the GALICAP study, the use of drugs with known prognostic benefits coincides with that observed in the major studies of this type recently published in the literature. In the Euro-Heart Failure Survey, 66% of the patients received ACE inhibitors and/or AII receptor antagonists and 37% received  $\beta$ -blockers<sup>33</sup>; in our study, these rates were 74% and 27%, respectively, in addition to the 19% who received a combination of the two. If we analyze the patients with systolic dysfunction (LVEF less than 50%) separately, the rates were 85%, 43%, and 37% for ACE inhibitors, AII receptor antagonists and their combination, respectively. However, the use of spironolactone was relatively limited, being administered to only 16% of the patients in the overall study group and 22% in the group with systolic dysfunction. In consequence, the GALICAP study demonstrates that current treatment of HF in Galicia and, given the

similarity, probably in the rest of Spain, is better than would be expected, although it is necessary to concentrate efforts in this respect in order to achieve a more widespread utilization of beta blockers and aldosterone inhibitors.

These results compare very favorably with those observed in many of the existing registries and studies, both in Spain and at an international level. The results of the BADAPIC study show rates of drug utilization similar to those found in clinical trials, with administration of ACE inhibitors or AII receptor antagonists in 87% of cases,  $\beta$ -blockers in 59% and spironolactone in 32%, and, surprisingly, with good survival and a low rate of complications during follow-up.<sup>18</sup> As the investigators themselves admit, the selection of patients with a low mean age (66 years), the relatively benign nature of the disease (only 68% of the patients had had previous hospital admissions for HF) and the characteristics of patient follow-up (specialized HF units) had an important influence on their results.

The treatment of HF with a normal LVEF is worthy of special mention. To date, drug utilization has been based on pathophysiological considerations, since there is a lack of clinical trials that offer precise guidelines for treatment.<sup>30,31</sup> Relieving congestion by means of diuretics, strict control of blood pressure, avoidance of tachycardia and maintenance of sinus rhythm to optimize ventricular filling, as well as the resolution of myocardial ischemia, are some of the therapeutic recommendations.

Two recent studies have indicated that the prognosis of this type of HF, in contrast to HF due to systolic dysfunction, has not improved over the past decade, despite the utilization of drugs that have been found to be useful in the latter type of HF.<sup>28,29</sup> This makes it necessary to increase research in therapy for an increasingly prevalent cardiovascular disease that has a very unfavorable prognosis. It also indicates that, while, from the therapeutic point of view, the behavior of systolic HF is relatively uniform, in HF with a normal LVEF, there could be highly heterogeneous groups of patients, with different responses to the possible therapeutic interventions.

### **Implications and Limitations**

We consider that studies of these characteristics best reflect the status of HF in a given area since they make it possible to include nearly all patients with a confirmed diagnosis of the disease. There may be a group of patients with HF that have not required hospital admission at any time during the course of their disease. However, if we take into account the nature of HF, we consider that to be a remote possibility and are convinced that the selection on the basis of this criterion avoids the enrollment of patients in whom the diagnosis is unclear. In our opinion, in many cases, their inclusion contaminates the results of different HF studies and registries.

In our series, 32% of the patients had not undergone echocardiography, a circumstance that could make the confirmation of the diagnosis of HF questionable. However, since the study was carried out in the hospital setting, we consider that the possibility of a false diagnosis is very limited.

## CONCLUSIONS

Heart disease with preserved systolic function is the most prevalent type of HF in Galicia and, in the majority of the cases, is associated with hypertension, as the control of arterial blood pressure is very limited. In patients with ischemic heart disease, the sex of the patient influences coronary angiography. Drug prescription does not appear to be optimal. It is necessary to promote multidisciplinary strategies to improve the care of these patients.

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