

Clinical profile, guideline-directed therapy uptake, and in-hospital mortality in acute heart failure at a public teaching hospital in southwestern Colombia: a single-centre retrospective registry (EVARISTO-AHF)

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Abstract

Background.

Real-world data on acute heart failure (AHF) from Colombian public tertiary-care centres remain scarce. We aimed to characterize the clinical profile, treatment patterns, and in-hospital outcomes of patients admitted for AHF to a high-complexity public university hospital in southwestern Colombia.

Methods.

Institutional, observational, retrospective registry (June 2022–October 2024) including 251 consecutive patients ≥ 18 years with AHF and a hospital stay > 48 hours at Hospital Universitario del Valle Evaristo García ESE. Data across eight pre-specified domains were captured in REDCap. Continuous variables are reported as median (interquartile range, IQR) and categorical variables as n (%). Groups were compared by left ventricular ejection fraction (LVEF) category ($< 40\%$ vs $\geq 40\%$) using the chi-square or Fisher exact test and the Mann–Whitney U test. Discharge prescription was computed among hospital survivors ($n = 234$).

Results.

Median age was 70 years (IQR 60.5–79); 59.8% were men; 14.7% were Afro-descendant; and 77.3% were enrolled in the subsidized health-insurance regime. LVEF was reduced ($< 40\%$) in 62.5% of patients, and the Stevenson wet–warm profile predominated (79.3%). In-hospital mortality was 6.8% (17/251). Guideline-directed medical therapy (GDMT) increased markedly from admission to discharge: SGLT-2 inhibitors 20.7%→76.1%, beta-blockers 46.2%→90.6%, mineralocorticoid receptor antagonists 30.3%→66.7%, and renin–angiotensin–aldosterone system inhibitors 61.4%→82.9%. At discharge, SGLT-2 inhibitor prescription was higher in HFrEF than in HFmrEF/HFpEF (84.5% vs 61.6%; odds ratio 3.38, 95% CI 1.82–6.30; $p < 0.001$).

Conclusions.

This institutional registry provides the first comprehensive characterization of AHF at a public teaching hospital in southwestern Colombia. Substantial progress in GDMT implementation was documented at discharge, with a residual LVEF-based gap in SGLT-2 inhibitor prescription that constitutes an actionable quality-improvement target.

Clinical trial number: not applicable.

Background

Heart failure (HF) is the final common pathway of many cardiovascular and non-cardiovascular diseases and remains a major public-health problem worldwide. The global prevalence is estimated at 1–2% in the adult population and rises to 10–20% in those over 70 years of age [1, 2]. Hospitalization for acute HF

(AHF) marks a turning point in the disease course: mortality increases several-fold after a first HF admission, and survivors lose years of life expectancy with each subsequent episode [3, 4].

Most of the evidence guiding AHF management comes from North American and European registries [5, 6]. Latin American data are comparatively scarcer and have tended to originate from specialized cardiovascular referral centres. The Colombian Heart Failure Registry (RECOLFACA) remains the largest national source, with 2528 patients across multiple centres [7]; the multicentre AMERICCAASS registry has provided contemporary cross-country data [8]; and the ICARUS registry recently reported outcomes in 1595 patients from a cardiovascular referral centre in Floridablanca [9]. What these registries have not captured is the reality of patients attended at public tertiary-care teaching hospitals – the institutions that serve the majority of low- and middle-income patients in the country and that differ from specialized centres in case mix, resource availability, and access to advanced therapies [10, 11].

Beyond descriptive characterization, quadruple guideline-directed medical therapy (GDMT) – beta-blockers, renin–angiotensin–aldosterone system inhibitors (RAASi, including angiotensin receptor–neprilysin inhibitors, ARNI), mineralocorticoid receptor antagonists (MRA), and sodium–glucose cotransporter-2 (SGLT-2) inhibitors [12, 13] – and the extension of SGLT-2 inhibitor indications across the LVEF spectrum [14, 15] are now the reference standard. Real-world evaluation of the implementation of these recommendations in Colombian public hospitals is essential to identify prescribing gaps, benchmark local performance, and inform targeted quality-improvement efforts.

The EVARISTO-AHF Institutional Registry was designed to address this gap. Here we report the retrospective phase (June 2022–October 2024), describing the sociodemographic and clinical profile, treatment patterns, and in-hospital outcomes – including comparisons across LVEF categories – in 251 consecutive patients hospitalized for AHF at a high-complexity public teaching hospital in Cali, Colombia.

Methods

Study design and setting

EVARISTO-AHF is an institutional, observational, descriptive registry planned in two methodological phases: a retrospective phase (June 2022–October 2024), which we report here, and an ongoing prospective phase. The registry was institutionalized by the Departments of Cardiology, Hemodynamics, Electrophysiology, Internal Medicine, Emergency Medicine, and Epidemiology of Hospital Universitario del Valle Evaristo García ESE, a public tertiary-care teaching hospital that serves as the main referral centre for five departments of southwestern Colombia (Valle del Cauca, Cauca, Nariño, Chocó, and Putumayo).

Participants

We included consecutive patients aged ≥ 18 years with a primary diagnosis of AHF and a hospital stay longer than 48 hours, admitted to the emergency department, intensive or coronary care units, or general medicine wards. AHF was defined as new or rapidly worsening signs and symptoms of HF with clinical, biochemical, imaging, or hemodynamic evidence of congestion and/or hypoperfusion, in accordance with the 2021 ESC and 2022 AHA/ACC/HFSA guidelines [12, 13]. Exclusion criteria were hospitalization for another primary condition with secondary HF decompensation; patients on the cardiac-transplant waiting list or with prior transplantation; long-term ventricular-assist device recipients; patients receiving palliative care only; pregnant women; and records with more than 30% missing data across the eight pre-specified domains. After applying these criteria, 251 patients constituted the analytic cohort (Fig. 1).

Data collection and variables

Cases were identified by systematic review of institutional ICD-10 records relevant to AHF. Each medical record was manually reviewed by two independent investigators, with disagreements resolved by consensus with a senior cardiologist. Data were captured in a standardized electronic case-report form in REDCap (v9.2.5) across eight domains: sociodemographic characteristics; past medical history and comorbidities; medications at admission; clinical and hemodynamic profile at admission; laboratory and ancillary test results; hospitalization data; in-hospital treatment; and discharge data. The hemodynamic profile was classified according to Stevenson as A (dry–warm), B (wet–warm), L (wet–cold), and C (dry–cold) [16]. LVEF categories followed the 2021 ESC guidelines: reduced ($< 40\%$), mildly reduced ($40\text{--}49\%$), and preserved ($\geq 50\%$) [12]. GDMT was defined by the four therapeutic pillars: beta-blockers, RAASi (ARNI, ACE inhibitors [ACEi], or angiotensin receptor blockers [ARB]), MRA, and SGLT-2 inhibitors.

Outcomes

The primary outcome was in-hospital mortality. Secondary outcomes were length of hospital stay, requirement for invasive mechanical ventilation, requirement for renal replacement therapy, use of inotropic or vasopressor support, and the prescription of each component of GDMT at admission compared with that at discharge.

Statistical analysis

Continuous variables were summarized as median (IQR) and categorical variables as n (%). Group comparisons were performed across LVEF categories ($< 40\%$ vs $\geq 40\%$) using the chi-square or Fisher exact test for categorical variables and the Mann–Whitney U test for continuous variables. Prescription of GDMT at admission was computed for the full cohort ($N = 251$), whereas prescription at discharge was computed among hospital survivors ($n = 234$); the change between admission and discharge is therefore presented descriptively (independent proportions), with a paired within-patient analysis planned for the prospective phase. SGLT-2 inhibitor prescription at discharge was compared across LVEF categories using the chi-square test, with the crude odds ratio (OR) and 95% confidence interval (CI).

Given the limited number of in-hospital deaths (n = 17), multivariable adjusted analyses were not performed and are planned for the prospective phase. A two-sided p-value < 0.05 was considered significant. Analyses were performed in R (v4.3.1). The study is reported according to the STROBE Statement.

Ethical considerations

The protocol was approved by the Institutional Ethics Committee of Hospital Universitario del Valle Evaristo García ESE (approval number HUV-CEI-2022-015) and classified as research without risk per Colombian Ministry of Health Resolution 008430 of 1993. Given the retrospective design and the use of fully de-identified data, the Ethics Committee waived the requirement for individual informed consent. The study was conducted in accordance with the Declaration of Helsinki.

Results

Sociodemographic characteristics and comorbidities

Between June 2022 and October 2024, 251 patients were included (Fig. 1). Median age was 70 years (IQR 60.5–79); 59.8% were men and 91.2% were Colombian nationals. Among those who reported ethnicity, 14.7% self-identified as Afro-descendant. The subsidized health-insurance regime covered 77.3% of patients and 7.2% were uninsured. De novo HF accounted for 43.0% of presentations, whereas 57.0% had a known history of HF (with a previous hospitalization in 41.8% of the cohort). Arterial hypertension (73.7%) was the most prevalent comorbidity, followed by dyslipidaemia (30.7%), coronary artery disease (29.1%), diabetes mellitus (27.5%), atrial fibrillation/flutter (25.5%), chronic kidney disease (15.9%), and COPD (15.9%) (Table 1).

Table 1. Sociodemographic characteristics, comorbidities, and pre-admission therapy, overall and by LVEF category (N=251).

Variable	Overall (N=251)	HFrEF (<40%, n=157)	HFmrEF/HFpEF (≥40%, n=94)	p
Age, years – median (IQR)	70 (60.5–79)	68 (55–76)	73.5 (65–83)	<0.001
Female sex	101 (40.2)	45 (28.7)	56 (59.6)	<0.001
Colombian nationality	229 (91.2)	143 (91.1)	86 (91.5)	0.68
Resident in Valle del Cauca	155 (61.8)	99 (63.1)	56 (59.6)	0.25
Subsidized insurance regime	194 (77.3)	120 (76.4)	74 (78.7)	
Uninsured	18 (7.2)	10 (6.4)	8 (8.5)	0.78
Afro-descendant	37 (14.7)	22 (14.0)	15 (16.0)	1.00
Arterial hypertension	185 (73.7)	107 (68.2)	78 (83.0)	0.01
Dyslipidaemia	77 (30.7)	49 (31.2)	28 (29.8)	1.00
Diabetes mellitus	69 (27.5)	46 (29.3)	23 (24.5)	0.52
Coronary artery disease	73 (29.1)	49 (31.2)	24 (25.5)	
Prior stroke / TIA	26 (10.4)	16 (10.2)	10 (10.6)	1.00
Atrial fibrillation / flutter	64 (25.5)	36 (22.9)	28 (29.8)	0.30
Chronic kidney disease	40 (15.9)	24 (15.3)	16 (17.0)	0.20
COPD	40 (15.9)	19 (12.1)	21 (22.3)	
RAASi at admission	154 (61.4)	89 (56.7)	65 (69.1)	
Beta-blocker at admission	116 (46.2)	73 (46.5)	43 (45.7)	
MRA at admission	76 (30.3)	57 (36.3)	19 (20.2)	
SGLT-2 inhibitor at admission	52 (20.7)	39 (24.8)	13 (13.8)	
Furosemide at admission	87 (34.7)	52 (33.1)	35 (37.2)	0.49
Statin at admission	84 (33.5)	53 (33.8)	31 (33.0)	0.94

Values are n (%) unless stated. p-values compare LVEF <40% vs ≥40% (chi-square, Fisher exact, or Mann–Whitney U). COPD, chronic obstructive pulmonary disease; MRA, mineralocorticoid receptor antagonist; RAASi, renin–angiotensin–aldosterone system inhibitor; SGLT-2, sodium–glucose cotransporter-2; TIA, transient ischaemic attack.

Aetiology, clinical presentation and hemodynamic profile

Ischaemic/post-infarction disease was the most frequent aetiology (29.9%), followed by valvular (17.5%), hypertensive (14.7%), idiopathic dilated cardiomyopathy (13.5%), other (13.9%), and undetermined (10.4%) (Fig. 2, Table 2). Acutely decompensated chronic HF was the most common presentation (75.7%), followed by acute pulmonary oedema (12.7%), cardiogenic shock (8.4%), and right HF (2.8%); NYHA class III–IV predominated at admission (69.6%). The Stevenson wet–warm profile (B) predominated (79.3%), followed by wet–cold (L, 13.5%), dry–warm (A, 6.0%), and dry–cold (C, 1.2%) (Fig. 3). Median systolic blood pressure was 139 mmHg (IQR 113.5–160) and median NT-proBNP 7906 pg/mL (IQR 2978–19200). Dyspnoea on exertion (91.2%) and lower-limb oedema (71.7%) were the most prevalent symptoms, and peripheral oedema (69.3%), pulmonary crackles (56.6%), and jugular venous distension (47.0%) the most common examination findings (Fig. 4, Table 3).

Table 2. Heart-failure-related clinical characteristics, overall and by LVEF category (N=251).

Variable	Overall (N=251)	HFrEF (<40%, n=157)	HFmrEF/HFpEF (≥40%, n=94)	p
Known history of HF	143 (57.0)	93 (59.2)	50 (53.2)	
With prior hospitalisation	105 (41.8)	71 (45.2)	34 (36.2)	
De novo HF	108 (43.0)	64 (40.8)	44 (46.8)	
Ischaemic / post-infarction aetiology	75 (29.9)	47 (29.9)	28 (29.8)	
Valvular aetiology	44 (17.5)	28 (17.8)	16 (17.0)	1.00
Hypertensive aetiology	37 (14.7)	21 (13.4)	16 (17.0)	1.00
Idiopathic dilated cardiomyopathy	34 (13.5)	24 (15.3)	10 (10.6)	0.39
Undetermined (not studied)	26 (10.4)	16 (10.2)	10 (10.6)	1.00
Other aetiology	35 (13.9)	21 (13.4)	14 (14.9)	
Decompensation: HF progression	109 (43.4)	80 (51.0)	29 (30.9)	0.04
Decompensation: ACS / infarction	37 (14.7)	19 (12.1)	18 (19.1)	
Decompensation: atrial fibrillation	29 (11.6)	16 (10.2)	13 (13.8)	
Decompensation: non- adherence	18 (7.2)	13 (8.3)	5 (5.3)	
Presentation: ADHF	190 (75.7)	119 (75.8)	72 (76.6)	
Presentation: acute pulmonary oedema	32 (12.7)	19 (12.1)	13 (13.8)	0.39
Presentation: cardiogenic shock	21 (8.4)	16 (10.2)	5 (5.3)	
Presentation: right HF	7 (2.8)	3 (1.9)	4 (4.3)	
Stevenson B (wet–warm)	199 (79.3)	121 (77.1)	78 (83.0)	0.76
Stevenson L (wet–cold)	34 (13.5)	23 (14.6)	11 (11.7)	
Stevenson A (dry–warm)	15 (6.0)	11 (7.0)	4 (4.3)	
Stevenson C (dry–cold)	3 (1.2)	2 (1.3)	1 (1.1)	
NT-proBNP, pg/mL – median (IQR)	7906 (2978– 19200)	10500 (4018– 20425)	5700 (2255–11300)	0.02

Values are n (%) unless stated. ACS, acute coronary syndrome; ADHF, acutely decompensated heart failure; NT-proBNP, N-terminal pro-B-type natriuretic peptide. Stevenson profiles: B wet–warm, L wet–cold, A dry–warm, C dry–cold.

Table 3. Vital signs, symptoms, and physical findings at admission, by LVEF category (N=251).

Variable	Overall (N=251)	HFrEF (<40%, n=157)	HFmrEF/HFpEF (≥40%, n=94)	p
Weight, kg – median (IQR)	66 (58–75.8)	65.3 (58–78)	66 (60–75)	0.89
Systolic BP, mmHg – median (IQR)	139 (113.5–160)	136 (110–154)	147.5 (123–164.5)	0.008
Diastolic BP, mmHg – median (IQR)	82 (70–98)	82 (70–97)	82 (71–99)	0.89
Heart rate, bpm – median (IQR)	85 (75–100)	86 (75–100)	82.5 (71–101.5)	0.47
NYHA III–IV*	167 (69.6)	106 (71.1)	61 (67.0)	
Dyspnoea on exertion	229 (91.2)	142 (90.4)	87 (92.6)	0.85
Lower-limb oedema	180 (71.7)	112 (71.3)	68 (72.3)	0.98
Dyspnoea at rest	170 (67.7)	109 (69.4)	61 (64.9)	0.50
Chest pain	113 (45.0)	72 (45.9)	41 (43.6)	0.79
Peripheral oedema (sign)	174 (69.3)	109 (69.4)	65 (69.1)	1.00
Pulmonary crackles	142 (56.6)	90 (57.3)	52 (55.3)	0.93
Jugular venous distension	118 (47.0)	79 (50.3)	39 (41.5)	0.27
Pleural effusion	80 (31.9)	47 (29.9)	33 (35.1)	0.46
Distal hypoperfusion	44 (17.5)	32 (20.4)	12 (12.8)	0.22

Values are n (%) unless stated. *NYHA class available in 240 patients. BP, blood pressure; NYHA, New York Heart Association.

Ancillary tests and ventricular function

The electrocardiogram showed sinus rhythm in 80.9% of patients, atrial fibrillation or flutter in 17.9%, and left bundle branch block in 19.1%. Chest X-ray showed cardiomegaly in 52.6% and pulmonary venous congestion in 61.0%. Median LVEF was 33%; reduced LVEF (<40%) was present in 62.5% of patients (n=157) and mildly-reduced or preserved LVEF (≥40%) in 37.5% (n=94) (Fig. 5). Severe mitral regurgitation was documented in 25.1% and severe tricuspid regurgitation in 17.5% (Table 4).

Table 4. Electrocardiographic, radiographic, and echocardiographic findings, by LVEF category (N=251).

Variable	Overall (N=251)	HFrEF (<40%, n=157)	HFmrEF/HFpEF (≥40%, n=94)	p
Sinus rhythm	203 (80.9)	128 (81.5)	75 (79.8)	
Atrial fibrillation / flutter (ECG)	45 (17.9)	27 (17.2)	18 (19.1)	
Left bundle branch block	48 (19.1)	39 (24.8)	9 (9.6)	
Right bundle branch block	19 (7.6)	13 (8.3)	6 (6.4)	
Cardiomegaly (chest X-ray)	132 (52.6)	90 (57.3)	42 (44.7)	
Pulmonary venous congestion	153 (61.0)	94 (59.9)	59 (62.8)	
Alveolar oedema	36 (14.3)	15 (9.6)	21 (22.3)	
PSAP, mmHg – median (IQR)	44 (35–55)	44 (35–55)	41 (35–53.5)	
TAPSE, mm – median (IQR)	18 (16–21)	16 (14–19)	18 (16–21)	
Severe mitral regurgitation	63 (25.1)	49 (31.2)	14 (14.9)	
Severe tricuspid regurgitation	44 (17.5)	30 (19.1)	14 (14.9)	
Severe aortic stenosis	12 (4.8)	9 (5.7)	3 (3.2)	

Values are n (%) unless stated. PSAP, pulmonary artery systolic pressure; TAPSE, tricuspid annular plane systolic excursion.

Guideline-directed medical therapy at admission and discharge

GDMT prescription increased substantially between admission and discharge (Fig. 6, Table 5). Among hospital survivors (n=234), prescription of beta-blockers rose from 46.2% at admission to 90.6% at discharge, RAASi from 61.4% to 82.9%, MRA from 30.3% to 66.7%, and SGLT-2 inhibitors from 20.7% to 76.1%. A shift from ARBs toward ARNI was evident (ARNI 12.4%→45.3%; ARB 35.1%→17.1%), consistent with current recommendations favouring ARNI in patients with reduced LVEF [12,13]. At discharge, SGLT-2 inhibitor prescription was significantly higher in patients with reduced LVEF than in those with mildly-reduced or preserved LVEF (84.5% [125/148] vs 61.6% [53/86]; OR 3.38, 95% CI 1.82–6.30; p<0.001).

Table 5. In-hospital outcomes and guideline-directed medical therapy at admission versus discharge.

A. In-hospital outcomes

Outcome	Overall (N=251)	HFrEF (n=157)	HFmrEF/HFpEF (n=94)
Total hospital stay, days – median (IQR)	13 (8–24.8)	13 (7.8–24.5)	15 (8–24.8)
General-ward stay, days – median (IQR)	9 (5–18)	9 (5–17.8)	9 (5–18)
Inotropic / vasopressor support	65 (25.9)	47 (29.9)	18 (19.1)
Invasive mechanical ventilation	29 (11.6)	15 (9.6)	14 (14.9)
Renal replacement therapy	24 (9.6)	8 (5.1)	16 (17.0)
In-hospital mortality	17 (6.8)	9 (5.7)	8 (8.5)

In-hospital mortality did not differ across LVEF categories (5.7% vs 8.5%; $p=0.40$). Leading causes of death: refractory heart failure 35.3%, infection 29.4%, arrhythmia 17.6%, other 17.6%.

B. GDMT prescription: admission (N=251) versus discharge among survivors (n=234)

Drug class	Admission (N=251)	Discharge (n=234)	Absolute change (pp)
RAASi	154 (61.4)	194 (82.9)	+21.6
ARNI	31 (12.4)	106 (45.3)	+32.9
ACEi	35 (13.9)	48 (20.5)	+6.6
ARB	88 (35.1)	40 (17.1)	+18.0
Beta-blocker	116 (46.2)	212 (90.6)	+44.4
MRA	76 (30.3)	156 (66.7)	+36.4
SGLT-2 inhibitor	52 (20.7)	178 (76.1)	+55.4

Values are n (%). pp, percentage points. At discharge, SGLT-2 inhibitor prescription was higher in HFrEF than in HFmrEF/HFpEF (84.5% [125/148] vs 61.6% [53/86]; OR 3.38, 95% CI 1.82–6.30; $p<0.001$).

In-hospital outcomes

Median total hospital stay was 13 days (IQR 8–24.8) and general-ward stay 9 days (IQR 5–18). Inotropic or vasopressor support was administered to 25.9% of patients, invasive mechanical ventilation to 11.6%, and renal replacement therapy to 9.6%. In-hospital mortality was 6.8% (17/251); it did not differ significantly between LVEF categories (5.7% in HFrEF vs 8.5% in HFmrEF/HFpEF; $p=0.40$). The leading causes of death were refractory heart failure (35.3%), infection (29.4%), arrhythmia (17.6%), and other causes (17.6%) (Table 5).

Discussion

The EVARISTO-AHF Registry provides the first comprehensive characterization of AHF patients admitted to a public tertiary-care teaching hospital in southwestern Colombia. Three findings deserve emphasis. First, the cohort captures a population under-represented in previous Colombian registries – predominantly subsidized-regime and partially Afro-descendant patients attended within the public health system. Second, GDMT prescription improved substantially by discharge, with SGLT-2 inhibitor uptake that exceeds previously reported Latin American benchmarks. Third, a clinically relevant gap in SGLT-2 inhibitor prescription between reduced and non-reduced LVEF categories persisted at discharge, identifying a specific quality-improvement target.

Sociodemographic and clinical profile in comparative perspective

The median age of 70 years is consistent with RECOLFACA (69 years) [7], AMERICCAASS (66 years) [8], and ICARUS (68 years) [9]. As in ICARUS [9] and most international registries, our cohort was male-predominant (59.8%). Two socioeconomic features distinguish EVARISTO-AHF from prior Colombian data: 77.3% of patients were enrolled in the subsidized regime – differing sharply from the contributive-regime predominance at specialized cardiovascular referral centres – and 14.7% self-identified as Afro-descendant, substantially higher than the 2.2% reported in AMERICCAASS [8], thereby documenting HF burden in a community historically under-represented in cardiovascular research. The comorbidity profile was broadly similar to other Latin American registries, with arterial hypertension (73.7%) the most prevalent comorbidity, matching RECOLFACA (72%) and ESC-HF-LT (73%) [5, 7].

In-hospital mortality

In-hospital mortality was 6.8%, higher than that reported by ICARUS (4.3%) [9] and consistent with the case-mix severity expected at a public referral hospital serving complex patients with limited pre-admission outpatient care. Mortality did not differ significantly across LVEF categories. Because only 17 in-hospital deaths were recorded, we deliberately refrained from multivariable modelling or subgroup mortality inference in this phase; a larger event base in the prospective phase will enable adjusted analyses of independent predictors. The leading causes of death – refractory HF and infection – highlight the vulnerability of this population and support institutional protocols for the early identification and management of nosocomial infection as part of acute HF care.

Implementation of guideline-directed medical therapy

The most encouraging finding of this study is the magnitude of change in GDMT from admission to discharge. Among survivors, beta-blocker prescription reached 90.6%, RAASi 82.9%, MRA 66.7%, and SGLT-2 inhibitors 76.1%. The SGLT-2 inhibitor prescription rate at discharge compares favourably with – and in several comparisons exceeds – recent Latin American benchmarks, including RECOLFACA (23.6% at enrolment) [7]. A close reading of the LVEF-stratified analysis, however, shows that prescription was

significantly higher in patients with reduced LVEF than in those with mildly-reduced or preserved LVEF (84.5% vs 61.6%; OR 3.38, 95% CI 1.82–6.30). This gap is of direct clinical interest because SGLT-2 inhibitors hold a Class I recommendation with proven benefit across the entire LVEF spectrum [12, 13, 14, 15]. The comparatively lower uptake in the preserved and mildly-reduced LVEF subgroups most likely reflects clinical inertia and the slower diffusion of the HFpEF evidence base among non-specialist providers, rather than structural or financial barriers, since both SGLT-2 inhibitors are covered under the Colombian Plan de Beneficios en Salud without distinction by LVEF category.

Strengths and limitations

The main strengths of this study are its structured, pre-specified design across eight REDCap domains, dual-independent record review, and the fact that it is the first comprehensive characterization of AHF from southwestern Colombia in a predominantly subsidized-regime and partially Afro-descendant population. Several limitations must be acknowledged. First, as a single-centre institutional registry, the results cannot be generalized to Colombia as a whole; the inherent selection bias of a public tertiary referral hospital contributes to the higher mortality compared with specialized centres. Second, the retrospective design introduces the possibility of case-ascertainment bias and incomplete documentation for some variables. Third, outpatient follow-up data were not available, precluding analysis of 30-day readmission and post-discharge persistence of GDMT. Fourth, the number of in-hospital deaths ($n = 17$) was insufficient to support multivariable adjustment; effect-size estimates are therefore restricted to the pre-specified LVEF comparison of GDMT. Fifth, the admission-versus-discharge comparison of GDMT uses independent proportions (admission $N = 251$ vs discharge survivors $n = 234$) rather than paired within-patient analyses, which will be feasible with the longitudinal data of the prospective phase.

Clinical implications

Two messages may be translated into routine practice at comparable settings. First, SGLT-2 inhibitor prescription at discharge is highly feasible even in resource-limited public tertiary-care settings, as shown by the 76.1% uptake among survivors; the residual gap between reduced and non-reduced LVEF subgroups is a direct target for provider education and local quality-improvement audits. Second, the substantial contribution of infection to in-hospital mortality calls for institutional protocols for the early identification and management of nosocomial infection as an integral part of acute HF care.

Conclusions

In this institutional registry of 251 patients hospitalized for AHF at a public tertiary-care teaching hospital in southwestern Colombia, we documented a distinctive sociodemographic profile characterized by a high proportion of subsidized-regime and Afro-descendant patients, and an in-hospital mortality of 6.8%. Guideline-directed medical therapy prescription improved substantially at discharge, with SGLT-2 inhibitor uptake (76.1% among survivors) exceeding previous Latin American benchmarks, although a residual gap across LVEF categories remains an actionable quality-improvement target. EVARISTO-AHF

complements existing Colombian HF evidence by characterizing the public tertiary-care setting and establishes a reproducible methodological precedent for institutional registries in resource-limited settings.

Abbreviations

ACEi, angiotensin-converting-enzyme inhibitor; AHF, acute heart failure; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor–neprilysin inhibitor; CI, confidence interval; COPD, chronic obstructive pulmonary disease; GDMT, guideline-directed medical therapy; HF, heart failure; HFmrEF, HF with mildly reduced ejection fraction; HFpEF, HF with preserved ejection fraction; HFrEF, HF with reduced ejection fraction; IQR, interquartile range; LVEF, left ventricular ejection fraction; MRA, mineralocorticoid receptor antagonist; NT-proBNP, N-terminal pro-B-type natriuretic peptide; NYHA, New York Heart Association; OR, odds ratio; RAASi, renin–angiotensin–aldosterone system inhibitor; REDCap, Research Electronic Data Capture; SGLT-2, sodium–glucose cotransporter-2; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology.

Declarations

Ethics approval and consent to participate

The protocol was approved by the Institutional Ethics Committee of Hospital Universitario del Valle Evaristo García ESE, Cali, Colombia (approval number HUV-CEI-2022-015), and classified as research without risk per Colombian Ministry of Health Resolution 008430 of 1993. Given the retrospective design and the use of fully de-identified data, the committee waived the requirement for individual informed consent. The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable. The manuscript does not contain any individual person's data in any form.

Availability of data and materials

The datasets generated and analysed during the current study are not publicly available owing to institutional data-sharing policies but are available from the corresponding author on reasonable request and subject to approval by the Institutional Ethics Committee of Hospital Universitario del Valle Evaristo García ESE.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Y.F.A.-Y.: conceptualization, methodology, investigation, data curation, writing—original draft. S.B.-B.: investigation, data curation, validation, writing—review and editing. S.A.-Z.: investigation, data curation, formal analysis, writing—review and editing. Á.H.-E.: conceptualization, methodology, supervision, project administration, writing—review and editing, and guarantor of the study. All authors read and approved the final manuscript.

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Figures

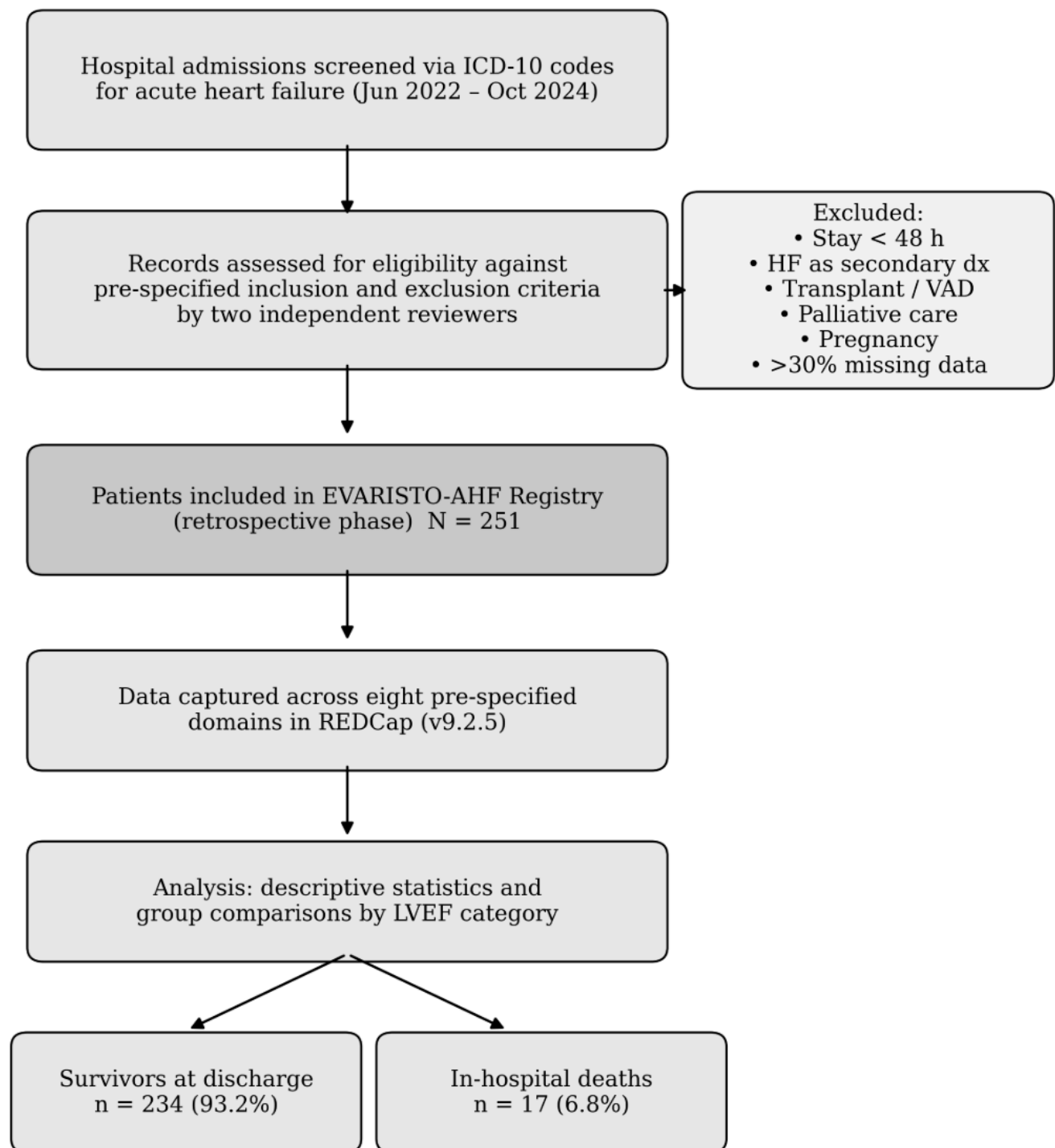


Figure 1

Participant flow of the EVARISTO-AHF Registry (retrospective phase, June 2022–October 2024), reported according to the STROBE Statement. HF, heart failure; VAD, ventricular-assist device.

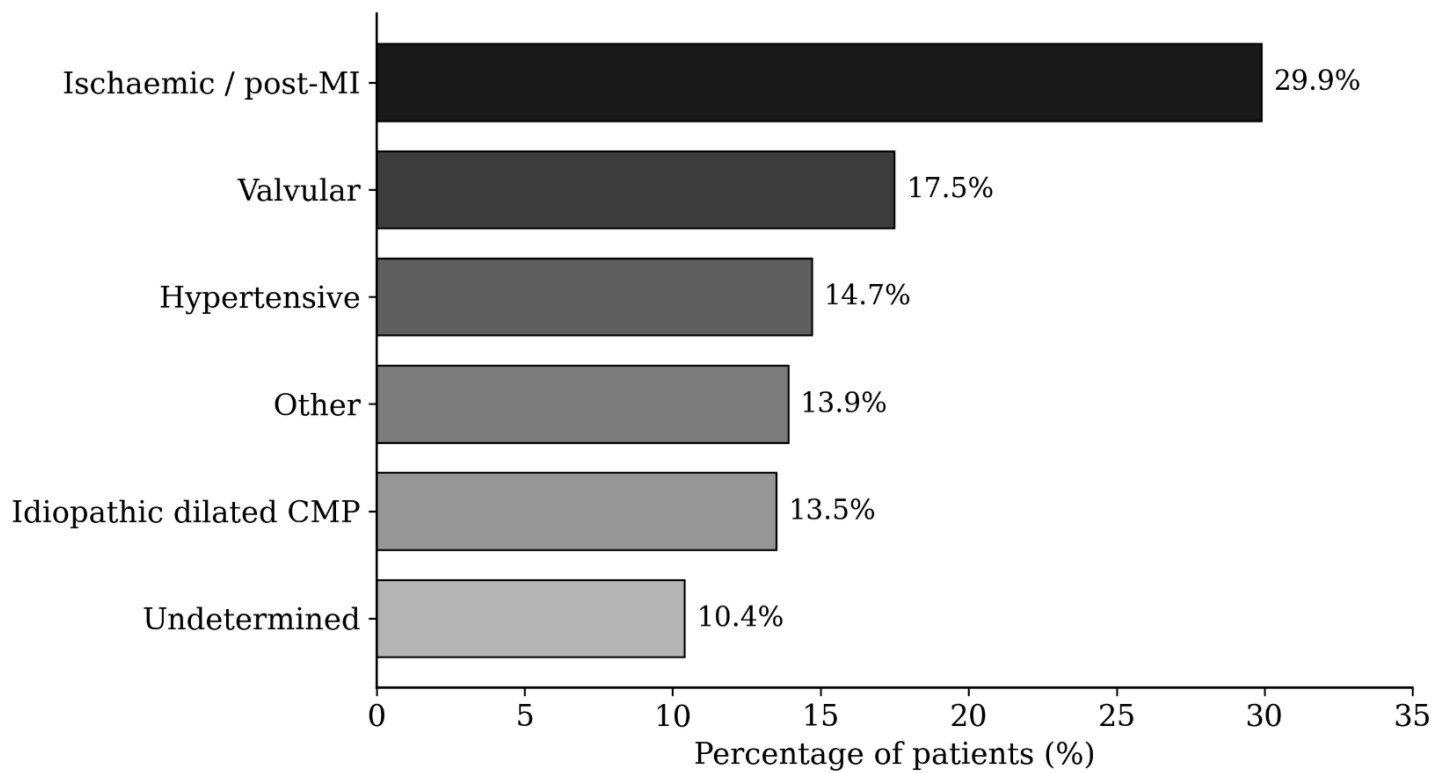


Figure 2

Distribution of heart-failure aetiologies (N=251).

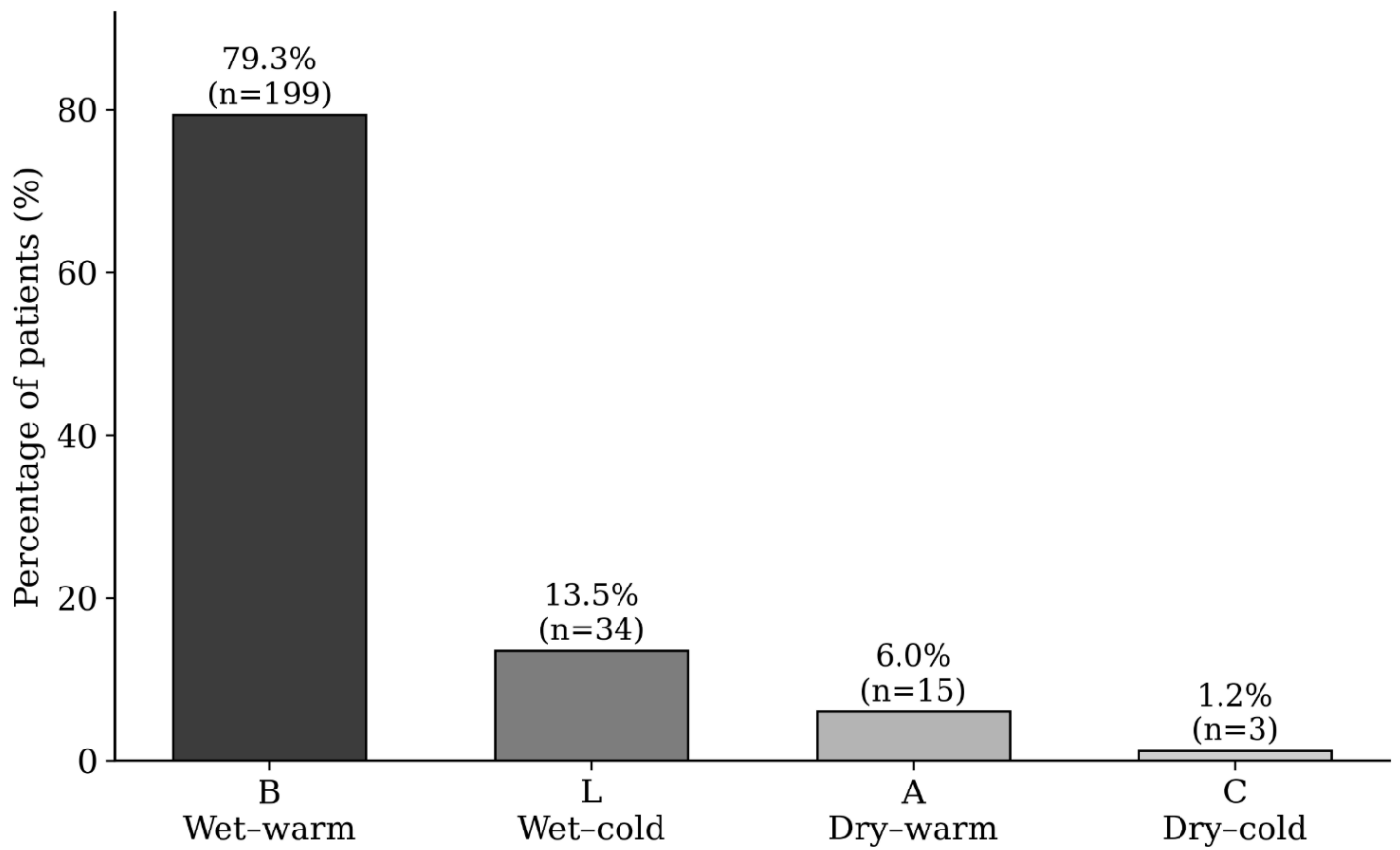


Figure 3

Distribution of Stevenson hemodynamic profiles (N=251): wet-warm (B) predominated (79.3%), followed by wet-cold (L, 13.5%), dry-warm (A, 6.0%), and dry-cold (C, 1.2%).

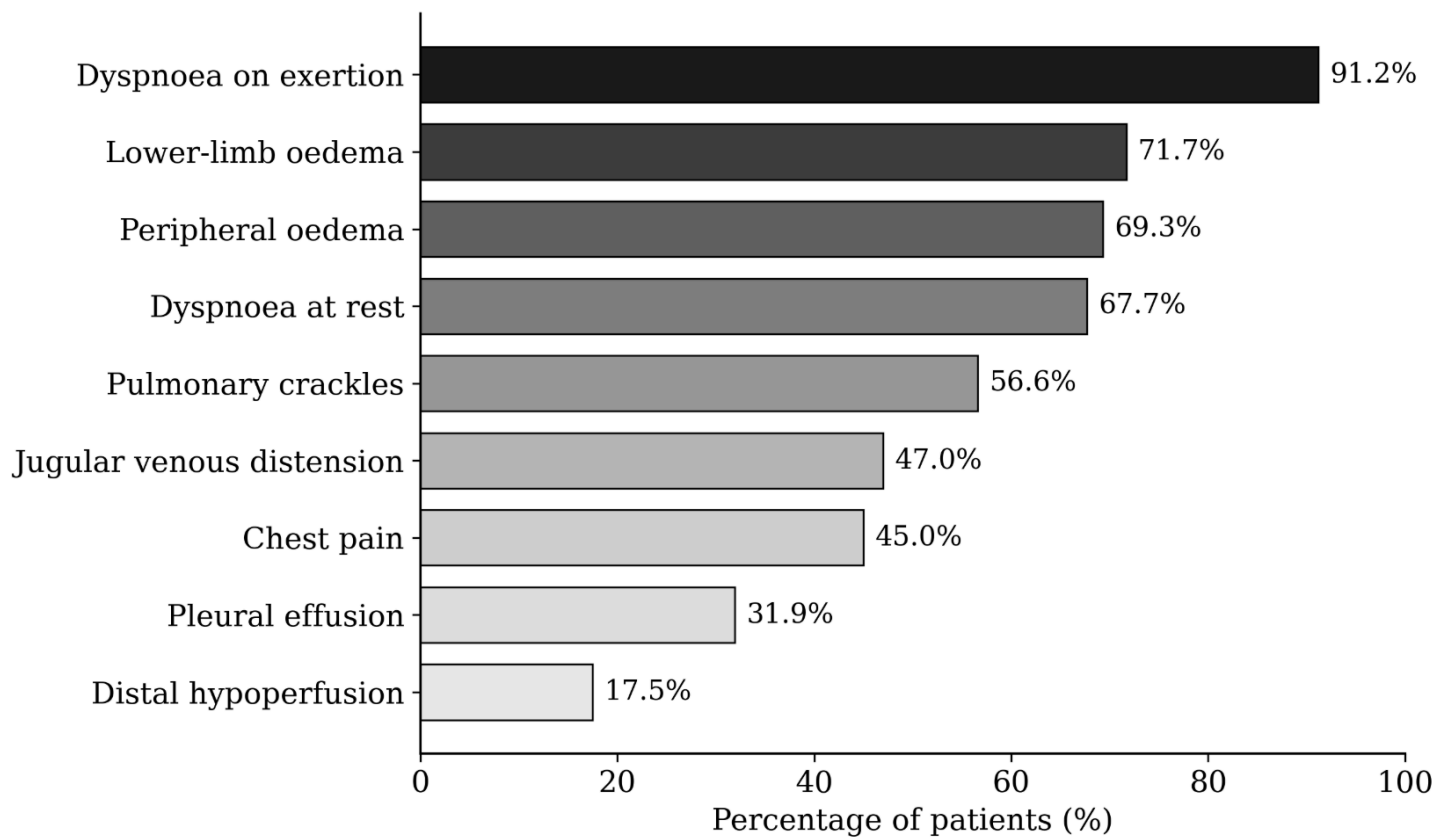


Figure 4

Prevalence of symptoms and signs at admission (N=251).

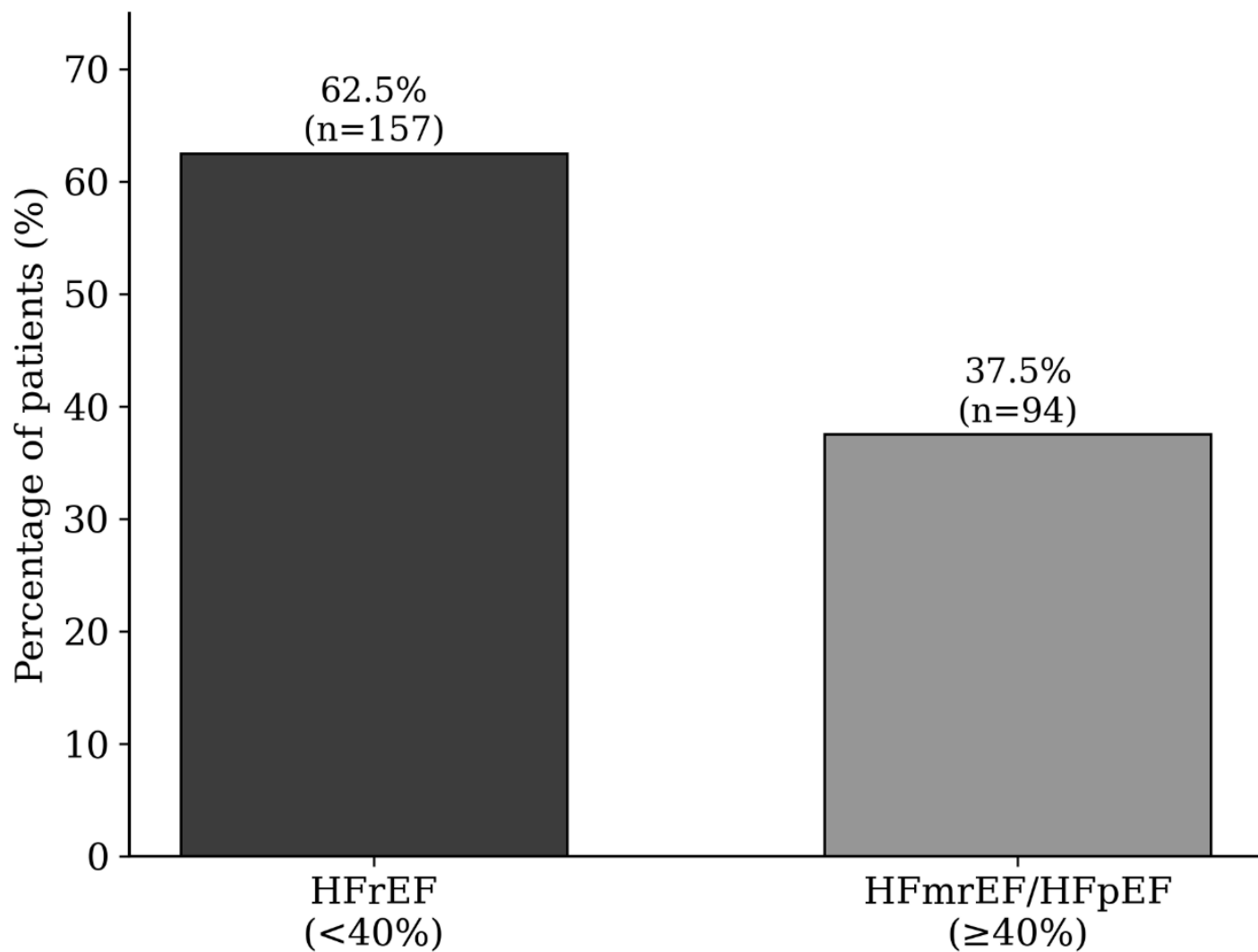


Figure 5

Distribution of left ventricular ejection fraction: reduced (HFrEF, <40%) versus mildly-reduced or preserved (HFmrEF/HFpEF, ≥40%).

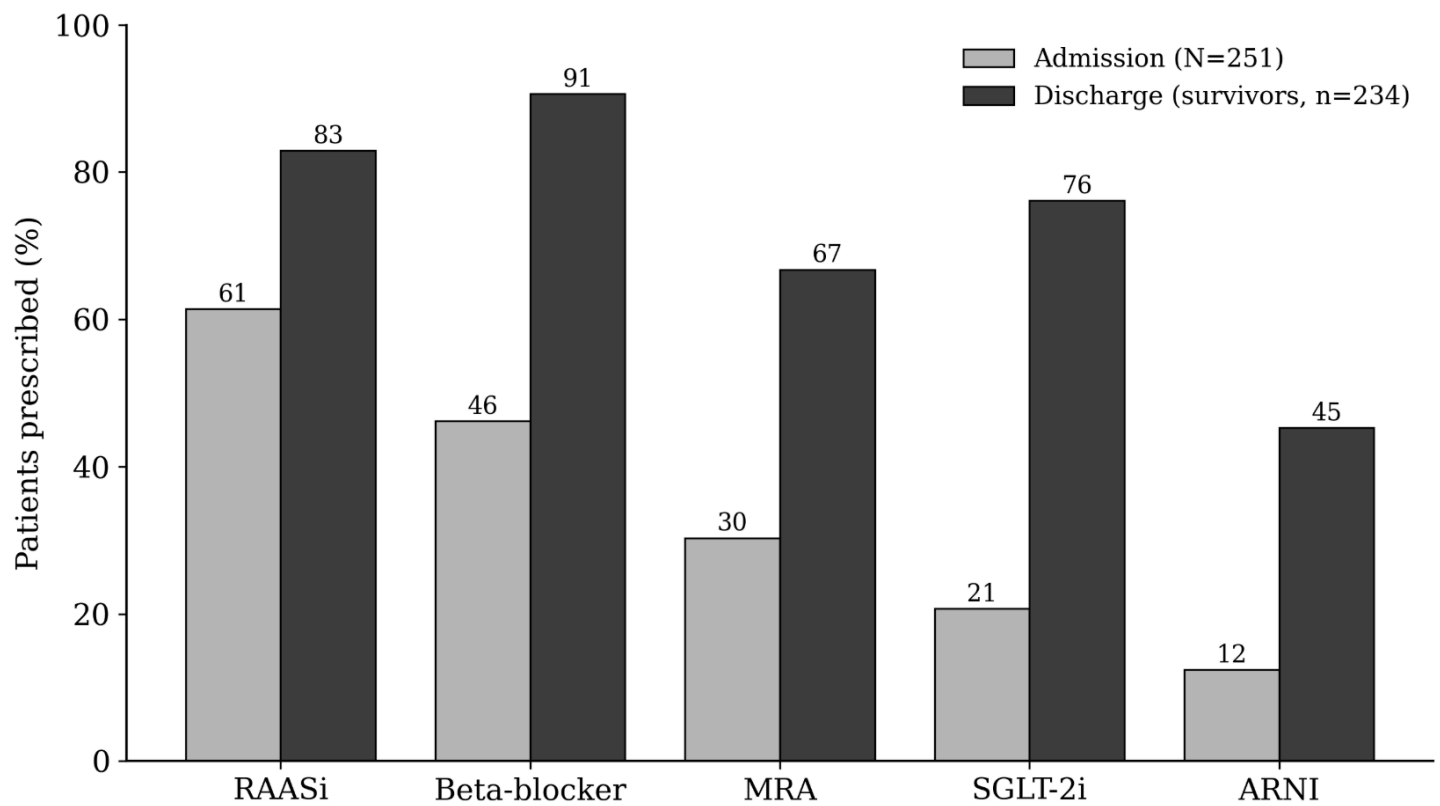


Figure 6

Guideline-directed medical therapy at admission (N=251) compared with discharge among survivors (n=234). ARNI, angiotensin receptor–neprilysin inhibitor; MRA, mineralocorticoid receptor antagonist; RAASi, renin–angiotensin–aldosterone system inhibitor; SGLT-2i, SGLT-2 inhibitor.

Supplementary Files

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