SUPPLEMENTAL MATERIAL

Table S1. Additional outcomes from National Patient Registry and Dispensed Drug Registry

Variable	Code	Register
obesity	ICD:E66	NPR
anemia	ICD:D5,D60-4	NPR
percutaneous coronary intervention	OP:FNG	NPR
coronary artery bypass graft	ICD:Z951,Z955 OP:FNA-F, FNH	NPR
ICD-CRT	OP:FPG,FPE26	NPR
no all-cause hospitalization	ICD:	NPR
no heart failure-hospitalization	ICD:I110,I130,I132,I255,I420,I423,I425,I426,I427,I428,I429,I43,I50,J81,K761,R57	NPR
no cardiovacular hospitalization	ICD:I,J81,K761,G45,R5	NPR
no non-cardiovacular hospitalization	ICD: Not I,J81,K761,G45,R57	NPR
all-cause visit	ICD:	NPR
no all-cause visit	ICD:	NPR
Sodium glucose cotrasporter 2 inhibitor	A 10BK0[1-6],A10BD15,A10BD16,A10BD19,A10BD20,A10BD21,A10BD23,A10BD24,A10BD25,A10BX09,A10BX11,A10BX12	DDR
insulin	A 10A	DDR
oral glucose lowering drug	A 10B	DDR
metformin	A10BA,A10BD02,A10BD03,A10BD05,A10BD07,A10BD08,A10BD10,A10BD11,A10BD13,A10BD15,A10BD16,A10BD20,A10BD23,A10BD25	DDR
sulfonylureas	A10BB,A10BC,A10BD02,A10BD04,A10BD06	DDR
alpha-glucosidase inhibitors	A10BF	DDR
thiazolidinediones	A10BG,A10BD03,A10BD04,A10BD05,A10BD06,A10BD09	DDR
glucagon like peptide 1a	A10BJ,A10BX04,A10BX07,A10BX10,A10BX13,A10BX14	DDR
dipeptidyl peptidase 4 inhibitor	A10BH,A10BD07,A10BD08,A10BD09,A10BD10,A10BD11,A10BD13,A10BD19,A10BD21,A10BD24,A10BD25	DDR
ace-inhibitor	C09A, C09B	DDR
angiotensin receptor blocker	C09C, C09D excl.04	DDR
diuretics	C03 excl.DA,C07B,C07C,C07D,C08GA,C09BA,C09DA,C09DX01	DDR
beta-blocker	C07	DDR

calcium channel blocker	C08,C07FB,C09BB,C09DB,C09DX01	DDR
mineralocorticoid receptor antagonist	C03DA	DDR
angiotensin receptor neprilysin inhibitor	C09DX04	DDR
antiplatlet	B01AC	DDR
anticoagulant	B01A excl.C	DDR
lipid lowering drug	C10	DDR
digoxin	C01AA05	DDR
nitrate	C01DA	DDR
antiarrhythmic drug	C01B	DDR

CRT=cardiac resynchronization therapy, DDR=dispensed drug registry, ICD=implantable cardioverter defibrillator, NPR=national patient registry

Table S2. Missing Data in the HF population

Variable	Missing (%)
n	
Sex Male, n (%)	0.0
Age, years, median (q1-q3)	0.0
Outpatient, n (%)	0.0
Year of registration, n (%)	0.0
2005-2010	
2011-2015	
2016-2018	
EF category, n (%)	0.0
HFrEF	
HFmrEF	
HFpEF	
HF duration > 6 months, n (%)	2.7
NYHA class, n (%)	31.4
I	
II	
III	
IV	
SBP, mmHg, median (q1-q3)	1.9
DBP, mmHg, median (q1-q3)	1.8
HR, bpm, median (q1-q3)	3.0
HR >70 bpm, n (%)	3.0
BMI, kg/m², median (q1-q3)	40.3
BMI ≥30, n (%)	40.3
LBBB, n (%)	16.9
Hb (g/L), median (q1-q3)	3.5
eGFR (mL/min/1.73 m²)*, median (q1-q3)	1.4

eGFR <60 mL/min/1.73 m², n (%)	1.4
NT-proBNP (pg/ml), median (q1-q3)	48.1
NT-proBNP above median, n (%)	48.1
Former/current smoker, n (%)	23.5
Diabetes, n (%)	0.0
AF, n (%)	0.0
Ischemic heart disease, n (%)	0.0
Anemia, n (%)	0.0
Hypertension, n (%)	0.0
Peripheral artery disease, n (%)	0.0
PCI, n (%)	0.0
CABG, n (%)	0.0
Stroke, n (%)	0.0
Valvular disease, n (%)	0.0
Hyperkalemia, n (%)	0.0
Hypokalemia, n (%)	0.0
Malignant cancer, n (%)	0.0
COPD, n (%)	0.0
Liver disease, n (%)	0.0
Dementia, n (%)	0.0
Severe bleeding, n (%)	0.0
Muscoloskeletal/connective tissue diseases, n (%)	0.0
Alcohol abuse, n (%)	0.0
Charlson comorbidity Index	0.0
Devices (ICD/CRT)	1.8
RASI/ARNI, n (%)	0.0
Diuretics, n (%)	0.0
Beta-blockers, n (%)	0.0
Calcium Channel Blockers, n (%)	0.0

MRA, n (%)	0.0
Antiplatelet therapy, n (%)	0.0
Anticoagulant therapy, n (%)	0.0
Insulin, n (%)	0.0
Oral hypoglycemic therapy, n (%)	0.0
Lipid lowering therapy, n (%)	0.0
Digoxin, n (%)	0.0
Nitrates, n (%)	0.0
Antiarrhythmic therapy, n (%)	0.0
Follow-up referral HF nurse clinic, n (%)	5.8
Follow-up referral speciality, n (%)	4.7
Hospital	
Primary care	
Other	
Family type Living alone, n (%)	0.2
Children, n (%)	0.0
Education, n (%)	2.2
Compulsory school	
Secondary school	
University	
Income above median, n (%)	0.2

AF=atrial fibrillation, BMI=body mass index, CABG=coronary artery by-pass graft, COPD=chronic obstructive pulmonary disease, CRT=cardiac resynchronization therapy, DBP=diastolic blood pressure, EF=ejection fraction, eGFR=estimated glomerular filtration rate, Hb=hemoglobin, ICD=implantable cardioverter defibrillator, HF=heart failure, HFmrEF=mildly reduced ejection fraction heart failure, HFpEF=preserved ejection fraction heart failure, HFrEF= reduced ejection fraction heart failure, HR=heart rate, LBBB=left bundle branch block, MRA=mineralocorticoid receptor antagonists, NYHA=New York Heart Association, NT-proBNP=N-terminal pro–B-type natriuretic peptide, PCI=percutaneous coronary intervention, RASI/ARNI=renin-angiotensin system inhibitors/angiotensin receptor neprilysin inhibitor, SBP=systolic blood pressure.

Table S3. Baseline characteristics across the EF categories compared to the matched non-HF population

Variable	HFrEF			HFmrEF			HFpEF		
	HF	non-HF	p	HF	non-HF	p	HF	non-HF	p
n	40,893	122,679		17,395	52,185		18,165	54,495	
Demographic/Organizational characteristics									
Sex Male, n (%)	29,047 (71.0)	87141 (71.0)	1.000	10,733 (61.7)	32199 (61.7)	1.000	8,434 (46.4)	25,302 (46.4)	1.000
Age, years, median (IQR)	73.0 [64.0, 81.0]	73.0 [64.0, 81.0]	1.000	76.0 [68.0, 83.0]	76.0 [68.0, 83.0]	1.000	80.0 [72.0, 85.0]	80.0 [72.0, 85.0]	1.000
Outpatient, n (%)	22,347 (54.6)	-		9,899 (56.9)	-		7,626 (42.0)	-	
Follow-up referral HF nurse clinic, n (%)	24,691 (63.7)	-		9,143 (55.6)	-		6,979 (41.6)	-	
Follow-up referral speciality, n (%)									
Hospital	29,757 (75.9)	-		10,324 (62.1)	-		8,128 (47.6)	-	
Primary care	8,437 (21.5)	-		5,852 (35.2)	-		8,368 (49.1)	-	
Other	1,012 (2.6)	-		444 (2.7)	-		562 (3.3)	-	
Year of registration, n (%)			1.000			1.000			1.000
2005-2010	15,174 (37.1)	45522 (37.1)		5,971 (34.3)	17913 (34.3)		6,369 (35.1)	19,107 (35.1)	
2011-2015	15,075 (36.9)	45225 (36.9)		6,355 (36.5)	19065 (36.5)		6,826 (37.6)	20,478 (37.6)	
2016-2018	10,644 (26.0)	31932 (26.0)		5,069 (29.1)	15207 (29.1)		4,970 (27.4)	14,910 (27.4)	
Clinical characteristics									
HF duration > 6 months, n (%)	18,326 (45.8)	-		8458 (50.0)	-		9,394 (53.8)	-	
NYHA class, n (%)									
I	2,753 (9.2)	-		1872 (15.6)	-		1,556 (14.8)	-	
II	14,160 (47.2)	-		6436 (53.6)	-		4,827 (46.0)	-	
III	11,962 (39.9)	-		3451 (28.7)	-		3,770 (35.9)	-	
IV	1,100 (3.7)	-		257 (2.1)	-		336 (3.2)	-	
SBP, mmHg, median (IQR)	120.0 [110.0, 140.0]	-		130.0 [117.0, 140.0]	-		130.0 [120.0, 145.0]	-	
DBP, mmHg, median (IQR)	71.0 [65.0, 80.0]	-		74.0 [65.0, 80.0]	-		70.0 [65.0, 80.0]	-	
HR, bpm, median (IQR)	72.0 [64.0, 84.0]	-		71.0 [62.0, 81.0]	-		72.0 [63.0, 82.0]	-	
HR >70 bpm, n (%)	21,539 (54.1)	-		8,438 (50.1)	-		9,131 (52.2)	-	
LBBB, n (%)	8,352 (24.5)	-		2,026 (14.1)	-		1,172 (7.8)	-	
Laboratory measurements									
Hb (g/L), median (IQR)	135.0 [122.0, 147.0]	-		132.0 [120.0, 144.0]	-		127.0 [115.0, 139.0]	-	

eGFR (mL/min/1.73 m²)*, median (IQR)	64.3 [47.1, 82.0]	-		62.9 [45.6, 80.3]	-		56.9 [40.9, 74.7]	-	
eGFR <60 mL/min/1.73 m², n (%)	17,522 (43.3)	-		7,833 (45.7)	-		9,790 (55.0)	-	
NT-proBNP (pg/ml), median (IQR)	2904.5 [1270.0, 6440.0]	-		1932.5 [798.8, 4247.5]	-		2020.0 [913.0, 4163.2]	-	
Hyperkalemia, n (%)	541 (1.3)	167 (0.1)	<0.001	226 (1.3)	87 (0.2)	<0.001	332 (1.8)	91 (0.2)	<0.001
Hypokalemia, n (%)	708 (1.7)	497 (0.4)	<0.001	361 (2.1)	266 (0.5)	<0.001	498 (2.7)	354 (0.6)	<0.001
Medical history/comorbidities									
BMI, kg/m², median (IQR)	26.1 [23.2, 29.7]	-		26.7 [23.8, 30.5]	-		27.0 [23.6, 31.2]	-	
BMI ≥30, n (%)	5,875 (23.8)	-		2,958 (28.2)	-		3,259 (31.2)	-	
Former/current smoker, n (%)	19,172 (59.4)	-		7,243 (54.7)	-		6,349 (49.1)	-	
Diabetes, n (%)	10,125 (24.8)	10216 (8.3)	<0.001	4212 (24.2)	4468 (8.6)	<0.001	4,921 (27.1)	4,745 (8.7)	<0.001
Renal failure, n (%)	4,757 (11.6)	2138 (1.7)	<0.001	2,078 (11.9)	951 (1.8)	<0.001	2,614 (14.4)	1,035 (1.9)	<0.001
AF, n (%)	19,290 (47.2)	8812 (7.2)	<0.001	9,304 (53.5)	4277 (8.2)	<0.001	10,999 (60.6)	4,861 (8.9)	<0.001
Ischemic heart disease, n (%)	22,076 (54.0)	17253 (14.1)	<0.001	9,569 (55.0)	7833 (15.0)	<0.001	8,411 (46.3)	8,505 (15.6)	<0.001
Anemia, n (%)	12,282 (31.0)	-		5,811 (34.8)	-		7,344 (42.0)	-	
Hypertension, n (%)	20,401 (49.9)	25,272 (20.6)	<0.001	10,196 (58.6)	11952 (22.9)	<0.001	12,313 (67.8)	13711 (25.2)	<0.001
Peripheral artery disease, n (%)	3,450 (8.4)	3,276 (2.7)	<0.001	1,574 (9.0)	1466 (2.8)	<0.001	1,691 (9.3)	1636 (3.0)	<0.001
PCI, n (%)	5,970 (14.6)	2,538 (2.1)	<0.001	2,671 (15.4)	1058 (2.0)	<0.001	1,435 (7.9)	967 (1.8)	<0.001
CABG, n (%)	9,723 (23.8)	4,609 (3.8)	<0.001	4,198 (24.1)	1936 (3.7)	<0.001	3,093 (17.0)	1897 (3.5)	<0.001
Stroke, n (%)	5,491 (13.4)	10,355 (8.4)	<0.001	2,486 (14.3)	4905 (9.4)	<0.001	2,982 (16.4)	5611 (10.3)	<0.001
Valvular disease, n (%)	6,806 (16.6)	2,627 (2.1)	<0.001	3,660 (21.0)	1253 (2.4)	<0.001	4,907 (27.0)	1417 (2.6)	<0.001
Malignant cancer, n (%)	5,332 (13.0)	14,212 (11.6)	<0.001	2,557 (14.7)	6480 (12.4)	<0.001	2,964 (16.3)	6640 (12.2)	<0.001
COPD, n (%)	4,788 (11.7)	3,432 (2.8)	<0.001	2,253 (13.0)	1532 (2.9)	<0.001	2,961 (16.3)	1857 (3.4)	<0.001
Liver disease, n (%)	849 (2.1)	859 (0.7)	<0.001	309 (1.8)	347 (0.7)	<0.001	394 (2.2)	276 (0.5)	<0.001
Dementia, n (%)	623 (1.5)	3,311 (2.7)	<0.001	263 (1.5)	1782 (3.4)	<0.001	424 (2.3)	2427 (4.5)	<0.001
Severe bleeding, n (%)	6,120 (15.0)	8,165 (6.7)	<0.001	3,208 (18.4)	3842 (7.4)	<0.001	4,158 (22.9)	4587 (8.4)	<0.001
Muscoloskeletal/connective tissue diseases, n (%)	11,162 (27.3)	23,551 (19.2)	<0.001	5,574 (32.0)	10837 (20.8)	<0.001	6,880 (37.9)	11757 (21.6)	<0.001
Alcohol abuse, n (%)	1,502 (3.7)	1,894 (1.5)	<0.001	464 (2.7)	675 (1.3)	<0.001	464 (2.6)	548 (1.0)	<0.001
Charlson comorbidity Index	2.0 [1.0, 4.0]	0.0 [0.0, 2.0]	<0.001	2.0 [1.0, 4.0]	0.0 [0.0, 2.0]	<0.001	3.0 [1.0, 4.0]	0.0 [0.0, 2.0]	<0.001

Treatments									
Devices (ICD/CRT)	2,917 (7.1)	48 (0.0)	<0.001	422 (2.4)	14 (0.0)	<0.001	191 (1.1)	16 (0.0)	<0.001
RASI/ARNI, n (%)	37,606 (92.0)	35,405 (28.9)	<0.001	15,117 (86.9)	15871 (30.4)	<0.001	13,931 (76.7)	16,732 (30.7)	<0.001
Diuretics, n (%)	31,563 (77.2)	26,891 (21.9)	<0.001	12,345 (71.0)	12789 (24.5)	<0.001	15,114 (83.2)	15,057 (27.6)	<0.001
Beta-blockers, n (%)	37,291 (91.2)	31,172 (25.4)	<0.001	15,137 (87.0)	14493 (27.8)	<0.001	14,949 (82.3)	16,217 (29.8)	<0.001
Calcium Channel Blockers, n (%)	6,706 (16.4)	22,461 (18.3)	<0.001	4,137 (23.8)	10187 (19.5)	<0.001	5,961 (32.8)	11,381 (20.9)	<0.001
MRA, n (%)	16,693 (40.8)	1,970 (1.6)	<0.001	5,053 (29.0)	933 (1.8)	<0.001	5,975 (32.9)	1,352 (2.5)	<0.001
Antiplatelet therapy, n (%)	21,157 (51.7)	30,547 (24.9)	<0.001	8,718 (50.1)	14166 (27.1)	<0.001	7,901 (43.5)	15,950 (29.3)	<0.001
Anticoagulant therapy, n (%)	18,291 (44.7)	8,906 (7.3)	<0.001	7,908 (45.5)	4210 (8.1)	<0.001	8,737 (48.1)	4,659 (8.5)	<0.001
Insulin, n (%)	4,803 (11.7)	5,178 (4.2)	<0.001	2,036 (11.7)	2248 (4.3)	<0.001	2,470 (13.6)	2,288 (4.2)	<0.001
Oral hypoglycemic therapy, n (%)	5,795 (14.2)	9,532 (7.8)	<0.001	2,358 (13.6)	4225 (8.1)	<0.001	2,580 (14.2)	4,149 (7.6)	<0.001
Lipid lowering therapy, n (%)	21,198 (51.8)	28,796 (23.5)	<0.001	9,086 (52.2)	12628 (24.2)	<0.001	7,986 (44.0)	12,876 (23.6)	<0.001
Digoxin, n (%)	6,691 (16.4)	1,566 (1.3)	<0.001	2,572 (14.8)	829 (1.6)	<0.001	3,126 (17.2)	1,043 (1.9)	<0.001
Nitrates, n (%)	12,352 (30.2)	6,495 (5.3)	<0.001	5,394 (31.0)	3078 (5.9)	<0.001	4,950 (27.3)	3,535 (6.5)	<0.001
Antiarrhythmic therapy, n (%)	1,807 (4.4)	444 (0.4)	<0.001	480 (2.8)	183 (0.4)	<0.001	407 (2.2)	180 (0.3)	<0.001
Socio-economic characteristics									
Family type Living alone, n (%)	18,854 (46.2)	49,426 (40.3)	<0.001	8,167 (47.0)	23,024 (44.2)	<0.001	9,964 (54.9)	27,688 (50.9)	<0.001
Children, n (%)	33,655 (82.3)	103,353 (84.2)	<0.001	14,736 (84.7)	44,431 (85.1)	0.175	15,424 (84.9)	46,632 (85.6)	0.030
Education, n (%)			<0.001			<0.001			<0.001
Compulsory school	17,414 (43.4)	46,324 (38.4)		7,524 (44.2)	20,837 (40.7)		8,743 (49.5)	24,094 (45.2)	
Secondary school	16,115 (40.2)	46,496 (38.6)		6,617 (38.8)	19,046 (37.2)		6,281 (35.6)	18,685 (35.0)	
University	6,572 (16.4)	27,792 (23.0)		2,892 (17.0)	11,344 (22.1)		2,643 (15.0)	10,535 (19.8)	
Income above median, n (%)	19,857 (48.7)	68,830 (56.2)	<0.001	7,996 (46.0)	26,427 (50.7)	<0.001	6,735 (37.1)	23,018 (42.3)	<0.001

AF=atrial fibrillation, BMI=body mass index, CABG=coronary artery by-pass graft, COPD=chronic obstructive pulmonary disease, CRT=cardiac resynchronization therapy, DBP=diastolic blood pressure, EF=ejection fraction, eGFR=estimated glomerular filtration rate, Hb=hemoglobin, ICD=implantable cardioverter defibrillator, HF=heart failure, HFmrEF=mildly reduced ejection fraction heart failure, HFpEF=preserved ejection fraction heart failure, HFrEF= reduced ejection fraction heart failure, HR=heart rate, IQR=interquartile range, LBBB=left bundle branch block, MRA=mineralocorticoid

receptor antagonists, NYHA=New York Heart Association, NT-proBNP= N-terminal pro–B-type natriuretic peptide, PCI=percutaneous coronary intervention, RASI/ARNI=renin-angiotensin system inhibitors/angiotensin receptor neprilysin inhibitor, SBP=systolic blood pressure.

*Categorical variables are presented with number and percentage, continuous variables with median and interquartile range. * GFR estimation derived from CKD-EPI formula.*

Table S4. Study outcomes in the HF population compared with the non-HF population

Outcome	Model	HF	Non-HF
First all-cause hospitalization	**Incidence**	534 (530-538)	162 (161-163)
	Unadjusted HR (95% CI), p-value	2.86 (2.83-2.89), <0.001	ref
Repeated all-cause hospitalizations	**Incidence**	980 (976-983)	297 (296-298)
	Unadjusted IRR (95% CI), p-value	3.93 (3.89-3.98), <0.001	ref
First HF hospitalization	**Incidence**	125 (124-127)	0
Repeated HF hospitalizations	**Incidence**	246 (244-247)	0
First CV hospitalization	**Incidence**	257 (255-260)	41 (41-42)
	Unadjusted HR (95% CI), p-value	5.47 (5.39-5.54), <0.001	ref
Repeated CV hospitalizations	**Incidence**	437 (435-440)	55 (55-56)
	Unadjusted IRR (95% CI), p-value	10.45 (10.29-10.61), <0.001	ref
First non-CV hospitalization	**Incidence**	291 (288-293)	134 (133-135)
	Unadjusted HR (95% CI), p-value	2.03 (2.01-2.05), <0.001	ref
Repeated Non-CV hospitalizations	**Incidence**	543 (540-545)	241 (240-242)
	Unadjusted IRR (95% CI), p-value	2.44 (2.41-2.47), <0.001	ref
First all-cause visit	**Incidence**	2486 (2468-2505)	554 (552-557)
	Unadjusted HR (95% CI), p-value	2.95 (2.92-2.97), <0.001	ref
Repeated all-cause visits	**Incidence**	4380 (4372-4387)	2072 (2069-2074)
	Unadjusted IRR (95% CI), p-value	2.26 (2.24-2.28), <0.001	ref
Repeated ER visits excluding trailing hospitalisation	**Incidence**	212 (211-214)	95 (94-95)
	Unadjusted IRR (95% CI), p-value	2.38 (2.34-2.43), <0.001	ref
First revascularization	**Incidence**	16 (15-16)	6 (6-6)
	Unadjusted HR (95% CI), p-value	2.64 (2.54-2.74), <0.001	ref
All-cause mortality	**Incidence**	127 (126-128)	50 (49-50)
	Unadjusted HR (95% CI), p-value	2.53 (2.50-2.56), <0.001	ref
CV mortality	**Incidence**	77 (76-78)	16 (16-16)
	Unadjusted HR (95% CI), p-value	4.67 (4.59-4.76), <0.001	ref
Non-CV mortality	**Incidence**	50 (49-51)	34 (33-34)
	Unadjusted HR (95% CI), p-value	1.49 (1.46-1.52), <0.001	ref

CV=cardiovascular, IRR=incidence rate ratio, HR=hazard ratio. *Incidence is reported as the rate for 1000 patients/year (95%CI)*

Table S5. Average length of in-hospital stay (LoS, days per follow-up year) in the HF vs non-HF population

	HF	Non-HF
All-cause LoS	7.1	2.1
HFrEF	6.4	-
HFmrEF	7.0	-
HFpEF	9.2	-
CV LoS	2.9	0.4
HFrEF	2.8	
HFmrEF	2.7	
HFpEF	3.4	
Non-CV LoS	4.2	1.7
HFrEF	3.5	
HFmrEF	4.2	
HFpEF	5.8	

CV=cardiovascular, HF=heart failure, HFmrEF=mildly reduced ejection fraction heart failure, HFpEF=preserved ejection fraction heart failure, HFrEF= reduced ejection fraction heart failure, LoS=length of stay

Table S6. Study outcomes in the HF population across the EF categories

Outcome	Model	HFrEF	HFmrEF	HFpEF
First all-cause hospitalization	**Incidence**	503 (497-508)	497 (489-505)	667 (657-678)
	Unadjusted HR (95% CI), p-value	ref	0.98 (0.96-0.99), 0.012	1.20 (1.18-1.22), <0.001
Repeated all-cause hospitalizations	**Incidence**	915 (910-919)	945 (938-952)	1187 (1178-1195)
	Unadjusted IRR (95% CI), p-value	ref	1.01 (0.99-1.03), 0.376	1.29 (1.26-1.32), <0.001
First HF hospitalization	**Incidence**	137 (135-139)	101 (98-103)	126 (123-129)
	Unadjusted HR (95% CI), p-value	ref	0.74 (0.72-0.76), <0.001	0.88 (0.86-0.91), <0.001
Repeated HF hospitalizations	**Incidence**	271 (269-273)	197 (194-200)	231 (228-235)
	Unadjusted IRR (95% CI), p-value	ref	0.69 (0.66-0.72), <0.001	0.85 (0.82-0.88), <0.001
First CV hospitalization	**Incidence**	260 (257-263)	227 (222-231)	284 (279-289)
	Unadjusted HR (95% CI), p-value	ref	0.87 (0.85-0.89), <0.001	1.02 (1.00-1.05), 0.031
Repeated CV hospitalizations	**Incidence**	446 (443-449)	393 (388-397)	462 (457-467)
	Unadjusted IRR (95% CI), p-value	ref	0.83 (0.81-0.86), <0.001	1.00 (0.97-1.03), 0.937
First non-CV hospitalization	**Incidence**	252 (249-255)	298 (293-304)	404 (397-411)
	Unadjusted HR (95% CI), p-value	ref	1.15 (1.13-1.18), <0.001	1.48 (1.45-1.51), <0.001
Repeated Non-CV hospitalizations	**Incidence**	468 (465-472)	553 (548-558)	725 (719-731)
	Unadjusted IRR (95% CI), p-value	ref	1.20 (1.17-1.23), <0.001	1.60 (1.56-1.64), <0.001
First all-cause visit	**Incidence**	2788 (2760-2816)	2243 (2209-2278)	2176 (2143-2209)
	Unadjusted HR (95% CI), p-value	ref	0.87 (0.86-0.89), <0.001	0.86 (0.84-0.87), <0.001
Repeated all-cause visits	**Incidence**	4230 (4220-4239)	4356 (4341-4371)	4798 (4781-4814)
	Unadjusted IRR (95% CI), p-value	ref	1.01 (1.00-1.03), 0.098	1.09 (1.07-1.10), <0.001
Repeated ER visits excluding trailing hospitalisation	**Incidence**	181 (179-183)	220 (216-223)	285 (281-289)
	Unadjusted IRR (95% CI), p-value	ref	1.19 (1.14-1.24), <0.001	1.55 (1.49-1.62), <0.001
First revascularization	**Incidence**	16 (16-17)	17 (16-18)	13 (12-14)
	Unadjusted IRR (95% CI), p-value	ref	1.01 (0.94-1.08), 0.784	0.74 (0.69-0.80), <0.001
All-cause mortality (%)	**Incidence**	116 (114-118)	121 (119-124)	162 (159-165)
	Unadjusted HR (95% CI), p-value	ref	1.04 (1.02-1.07), 0.001	1.38 (1.35-1.42), <0.001
CV mortality (%)	**Incidence**	74 (73-75)	70 (69-72)	92 (90-94)
	Unadjusted HR (95% CI), p-value	ref	0.95 (0.92-0.98), 0.001	1.22 (1.18-1.26), <0.001

Non-CV mortality (%)	Incidence	42 (41-43)	51 (49-53)	70 (68-72)
	Unadjusted HR (95% CI), p-value	ref	1.21 (1.16-1.26), <0.001	1.67 (1.61-1.73), <0.001

CV=cardiovascular, IRR=incidence rate ratio, ER=emergency room, HFmrEF=mildly reduced ejection fraction heart

failure, HFpEF=preserved ejection fraction heart failure, HFrEF= reduced ejection fraction heart failure, HR=hazard ratio.

Incidence is reported as the rate for 1000 patients/year (95%CI)

Table S7. Study outcomes across the EF categories compared to the matched non-HF population

		HFrEF Case	HFrEF Control	HFmrEF Case	HFmrEF Control	HFpEF Case	HFpEF Control
First all-cause hospitalization	Incidence	503 (497-508)	149 (148-150)	497 (489-505)	168 (166-169)	667 (657-678)	191 (189-193)
	Unadjusted HR (95% CI), p-value	2.91 (2.88-2.95), <0.001	ref	2.64 (2.59-2.70), <0.001	ref	3.01 (2.95-3.07), <0.001	ref
Repeated all-cause hospitalizations	Incidence	915 (910-919)	279 (278-280)	945 (938-952)	304 (302-306)	1187 (1178-1195)	335 (332-337)
	Unadjusted IRR (95% CI), p-value	3.92 (3.86-3.98), <0.001	ref	3.65 (3.57-3.74), <0.001	ref	4.21 (4.12-4.30), <0.001	ref
First HF hospitalization	Incidence	137 (135-139)	0, 0 (0-0)	101 (98-103)	0, 0 (0-0)	126 (123-129)	0, 0 (0-0)
Repeated HF hospitalizations	Incidence	271 (269-273)	0, 0 (0-0)	197 (194-200)	0, 0 (0-0)	231 (228-235)	0, 0 (0-0)
First CV hospitalization	Incidence	260 (257-263)	39 (38-39)	227 (222-231)	43 (42-43)	284 (279-289)	47 (46-48)
	Unadjusted HR (95% CI), p-value	5.80 (5.70-5.91), <0.001	ref	4.84 (4.70-4.97), <0.001	ref	5.38 (5.23-5.52), <0.001	ref
Repeated CV hospitalizations	Incidence	446 (443-449)	53 (52-53)	393 (388-397)	57 (56-58)	462 (457-467)	61 (60-62)
	Unadjusted IRR (95% CI), p-value	11.57 (11.33-11.81), <0.001	ref	8.80 (8.52-9.10), <0.001	ref	9.70 (9.41-10.00), <0.001	ref
First non-CV hospitalization	Incidence	252 (249-255)	123 (122-124)	298 (293-304)	138 (137-140)	404 (397-411)	158 (156-160)
	Unadjusted HR (95% CI), p-value	1.92 (1.89-1.95), <0.001	ref	2.03 (1.98-2.07), <0.001	ref	2.35 (2.30-2.40), <0.001	ref
Repeated Non-CV hospitalizations	Incidence	468 (465-472)	227 (225-228)	553 (548-558)	247 (245-248)	725 (719-731)	273 (271-275)
	Unadjusted IRR (95% CI), p-value	2.19 (2.16-2.23), <0.001	ref	2.45 (2.39-2.51), <0.001	ref	2.93 (2.86-3.00), <0.001	ref
First all-cause visit	Incidence	2788 (2760-2816)	522 (519-525)	2243 (2209-2278)	573 (568-578)	2176 (2143-2209)	620 (614-626)
	Unadjusted HR (95% CI), p-value	3.31 (3.27-3.35), <0.001	ref	2.69 (2.64-2.74), <0.001	ref	2.51 (2.47-2.56), <0.001	ref
Repeated all-cause visits	Incidence	4230 (4220-4239)	2028 (2024-2031)	4356 (4341-4371)	2135 (2130-2141)	4798 (4781-4814)	2120 (2114-2126)
	Unadjusted IRR (95% CI), p-value	2.24 (2.21-2.27), <0.001	ref	2.18 (2.13-2.22), <0.001	ref	2.39 (2.34-2.43), <0.001	ref
Repeated ER visits excluding trailing hospitalisation	Incidence	181 (179-183)	86 (85-87)	220 (216-223)	101 (100-102)	285 (281-289)	111 (110-113)
	Unadjusted IRR (95% CI), p-value	2.28 (2.21-2.35), <0.001	ref	2.24 (2.15-2.33), <0.001	ref	2.70 (2.60-2.81), <0.001	ref
First revascularization	Incidence	16 (16-17)	6 (6-6)	17 (16-18)	6 (5-6)	13 (12-14)	5 (5-5)
	Unadjusted IRR (95% CI), p-value	2.60 (2.47-2.73), <0.001	ref	2.87 (2.66-3.10), <0.001	ref	2.49 (2.28-2.71), <0.001	ref
All-cause mortality (%)	Incidence	116 (114-118)	43 (43-44)	121 (119-124)	52 (51-52)	162 (159-165)	65 (64-66)
	Unadjusted HR (95% CI), p-value	2.66 (2.61-2.71), <0.001	ref	2.34 (2.28-2.41), <0.001	ref	2.49 (2.44-2.56), <0.001	ref
CV mortality (%)	Incidence	74 (73-75)	14 (14-14)	70 (69-72)	17 (16-17)	92 (90-94)	22 (21-22)

	Unadjusted HR (95% CI), p-value	5.26 (5.12-5.41), <0.001	ref	4.12 (3.96-4.29), <0.001	ref	4.18 (4.03-4.34), <0.001	ref
Non-CV mortality (%)	**Incidence**	42 (41-43)	29 (29-30)	51 (49-53)	35 (34-35)	70 (68-72)	43 (42-44)
	Unadjusted HR (95% CI), p-value	1.42 (1.39-1.46), <0.001	ref	1.47 (1.41-1.53), <0.001	ref	1.64 (1.58-1.69), <0.001	ref

CV=cardiovascular, ER=emercency room, HF=heart failure, HFmrEF=mildly reduced ejection fraction heart failure,

HFpEF=preserved ejection fraction heart failure, HFrEF= reduced ejection fraction heart failure HR=hazard ratio,

IRR=incidence rate ratio. *Incidence is reported as the rate for 1000 patients/year (95%CI)*

Table S8. Study outcomes across the EF categories in ischemic vs non-ischemic patients

		HFrEF ischemic	HFrEF non-ischemic	HFmrEF ischemic	HFmrEF non-ischemic	HFpEF ischemic	HFpEF non-ischemic
First all-cause hospitalization	Incidence	600 (587-613)	452 (443-462)	506 (489-525)	492 (477-507)	731 (701-762)	643 (626-659)
	Unadjusted HR (95% CI), p-value	ref	0.81 (0.79-0.84), <0.001	0.87 (0.84-0.91), <0.001	0.85 (0.82-0.88), <0.001	1.15 (1.10-1.21), <0.001	1.04 (1.01-1.08), 0.014
Repeated all-cause hospitalizations	Incidence	1049 (1038-1060)	782 (774-790)	965 (949-982)	903 (890-917)	1275 (1251-1299)	1128 (1115-1142)
	Unadjusted IRR (95% CI), p-value	ref	0.73 (0.71-0.76), <0.001	0.87 (0.83-0.92), <0.001	0.84 (0.80-0.87), <0.001	1.20 (1.14-1.27), <0.001	1.08 (1.04-1.12), <0.001
First HF hospitalization	Incidence	170 (165-176)	122 (119-126)	103 (97-109)	104 (99-109)	138 (130-148)	131 (126-136)
		ref	0.76 (0.73-0.80), <0.001	0.63 (0.59-0.67), <0.001	0.63 (0.60-0.67), <0.001	0.81 (0.76-0.87), <0.001	0.77 (0.73-0.81), <0.001
Repeated HF hospitalizations	Incidence	320 (314-326)	222 (217-226)	204 (197-212)	195 (189-202)	251 (240-261)	226 (220-232)
		ref	0.68 (0.64-0.73), <0.001	0.58 (0.53-0.63), <0.001	0.58 (0.53-0.62), <0.001	0.74 (0.67-0.81), <0.001	0.71 (0.66-0.76), <0.001
First CV hospitalization	Incidence	331 (323-340)	226 (221-232)	235 (225-245)	221 (213-230)	316 (301-332)	274 (266-283)
	Unadjusted HR (95% CI), p-value	ref	0.74 (0.72-0.77), <0.001	0.74 (0.70-0.77), <0.001	0.70 (0.67-0.74), <0.001	0.94 (0.89-0.99), 0.019	0.83 (0.80-0.87), <0.001
Repeated CV hospitalizations	Incidence	532 (524-540)	367 (361-372)	413 (403-424)	369 (360-377)	501 (486-517)	428 (420-436)
	Unadjusted IRR (95% CI), p-value	ref	0.67 (0.64-0.70), <0.001	0.71 (0.67-0.76), <0.001	0.65 (0.61-0.68), <0.001	0.88 (0.82-0.95), <0.001	0.78 (0.74-0.82), <0.001
First non-CV hospitalization	Incidence	288 (280-296)	236 (231-242)	310 (298-322)	306 (296-316)	456 (435-477)	398 (387-409)
	Unadjusted HR (95% CI), p-value	ref	0.85 (0.82-0.88), <0.001	1.07 (1.02-1.12), 0.005	1.06 (1.01-1.10), 0.011	1.49 (1.41-1.57), <0.001	1.32 (1.27-1.38), <0.001
Repeated Non-CV hospitalizations	Incidence	517 (509-525)	415 (409-421)	552 (540-565)	1535 (525-545)	774 (755-793)	700 (690-711)
	Unadjusted IRR (95% CI), p-value	ref	0.79 (0.76-0.83), <0.001	1.06 (1.01-1.12), 0.029	1.05 (1.00-1.10), 0.047	1.57 (1.48-1.67), <0.001	1.40 (1.34-1.46), <0.001
First all-cause visit	Incidence	3203 (3138-3270)	2914 (2861-2968)	2378 (2304-2455)	2288 (2227-2351)	2312 (2222-2404)	2207 (2155-2260)
	Unadjusted HR (95% CI), p-value	ref	0.95 (0.92-0.98), <0.001	0.84 (0.81-0.88), <0.001	0.82 (0.79-0.84), <0.001	0.83 (0.79-0.87), <0.001	0.80 (0.78-0.83), <0.001
Repeated all-cause visits	Incidence	4556 (4533-4580)	, 4164 (4145-4183)	4345 (4310-4379)	4344 (4314-4373)	5215 (5167-5264)	4792 (4764-4820)
	Unadjusted IRR (95% CI), p-value	ref	0.91 (0.89-0.94), <0.001	0.94 (0.91-0.97), 0.001	0.95 (0.92-0.98), 0.002	1.09 (1.05-1.14), <0.001	1.01 (0.98-1.04), 0.342
Repeated ER visits excluding trailing hospitalisation	Incidence	234 (228-239)	174 (170-178)	271 (262-279)	235 (228-242)	373 (360-386)	316 (309-324)
	Unadjusted IRR (95% CI), p-value	ref	0.75 (0.70-0.80), <0.001	1.14 (1.04-1.24), 0.003	0.98 (0.91-1.06), 0.609	1.61 (1.46-1.78), <0.001	1.33 (1.24-1.43), <0.001
	Incidence	30 (28-32)	12 (11-13)	31 (28-34)	12 (10-13)	25 (22-29)	10 (8-11)

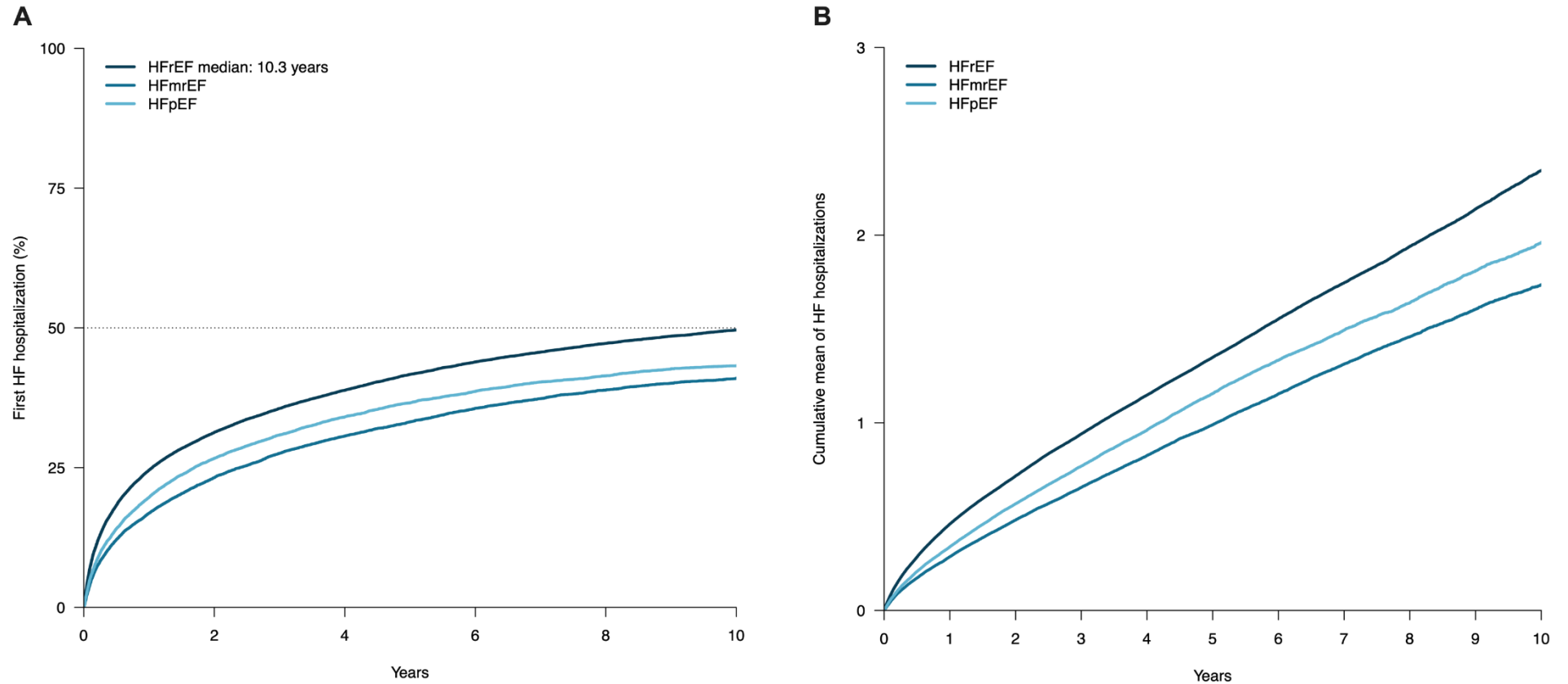|							
First revascularization	**Unadjusted IRR (95% CI), p-value**	ref	0.41 (0.37-0.46), <0.001	1.02 (0.91-1.15), 0.710	0.39 (0.34-0.46), <0.001	0.82 (0.70-0.95), 0.010	0.31 (0.27-0.36), <0.001
All-cause mortality (%)	**Incidence**	138 (134-142)	95 (92-98)	122 (116-128)	120 (116-125)	175 (166-184)	164 (159-169)
	Unadjusted HR (95% CI), p-value	ref	0.69 (0.67-0.72), <0.001	0.88 (0.84-0.93), <0.001	0.87 (0.83-0.92), <0.001	1.26 (1.19-1.33), <0.001	1.18 (1.13-1.23), <0.001
CV mortality (%)	**Incidence**	92 (89-95)	57 (55-59)	73 (68-77)	69 (65-73)	95 (89-102)	93 (89-97)
	Unadjusted HR (95% CI), p-value	ref	0.63 (0.59-0.66), <0.001	0.79 (0.74-0.85), <0.001	0.75 (0.70-0.80), <0.001	1.03 (0.95-1.11), 0.504	1.01 (0.95-1.06), 0.795
Non-CV mortality (%)	**Incidence**	46 (44-48)	38 (36-40)	49 (46-53)	52 (49-55)	79 (74-86)	71 (67-74)
	Unadjusted HR (95% CI), p-value	ref	0.83 (0.78-0.89), <0.001	1.07 (0.98-1.17), 0.157	1.12 (1.04-1.22), 0.004	1.72 (1.57-1.88), <0.001	1.53 (1.43-1.64), <0.001

CV=cardiovascular, ER=emercency room, HF=heart failure, HFmrEF=mildly reduced ejection fraction heart failure,

HFpEF=preserved ejection fraction heart failure, HFrEF= reduced ejection fraction heart failure HR=hazard ratio,
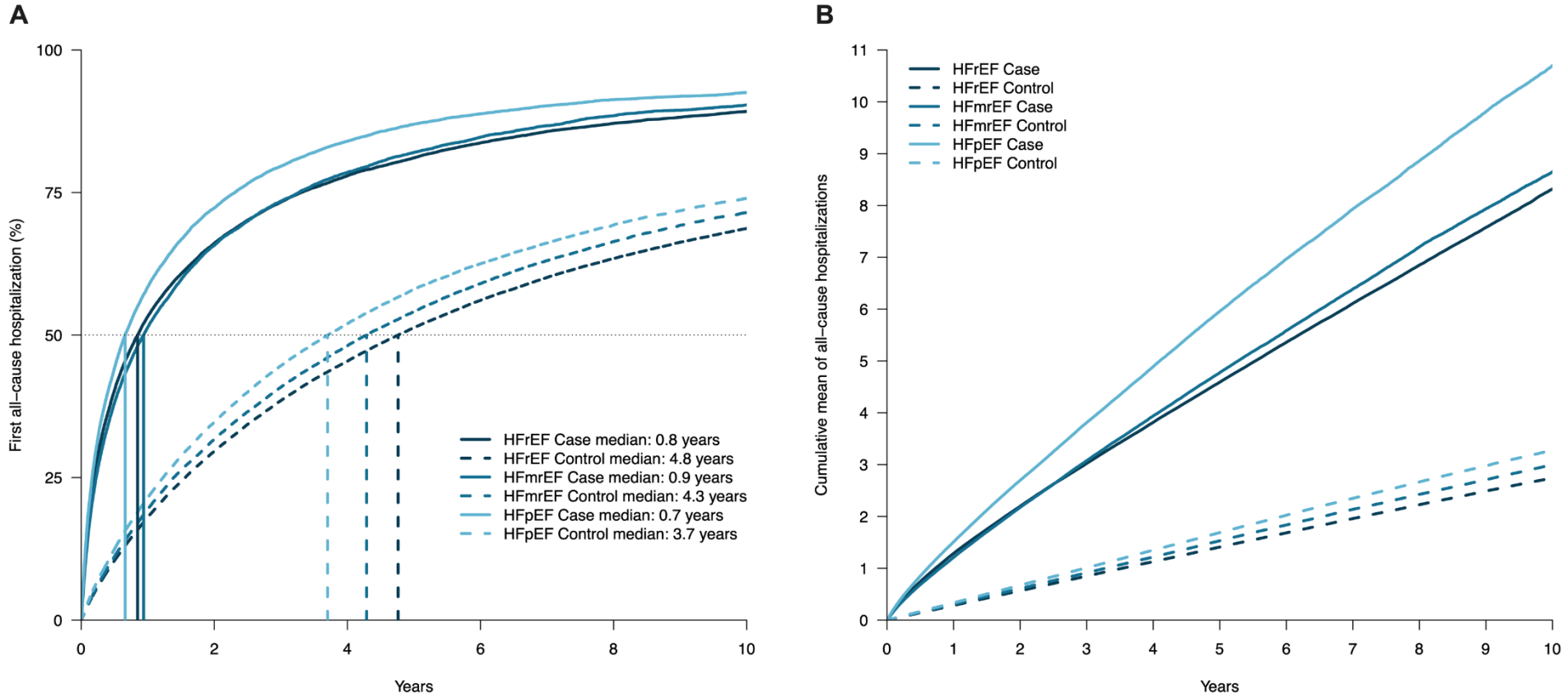
IRR=incidence rate ratio. *Incidence is reported as the rate for 1000 patients/year (95%CI)*

Figure S1. Incidence of first heart failure hospitalization (panel A) and mean cumulative heart failure hospitalizations visits (panel B) across the ejection fraction categories.
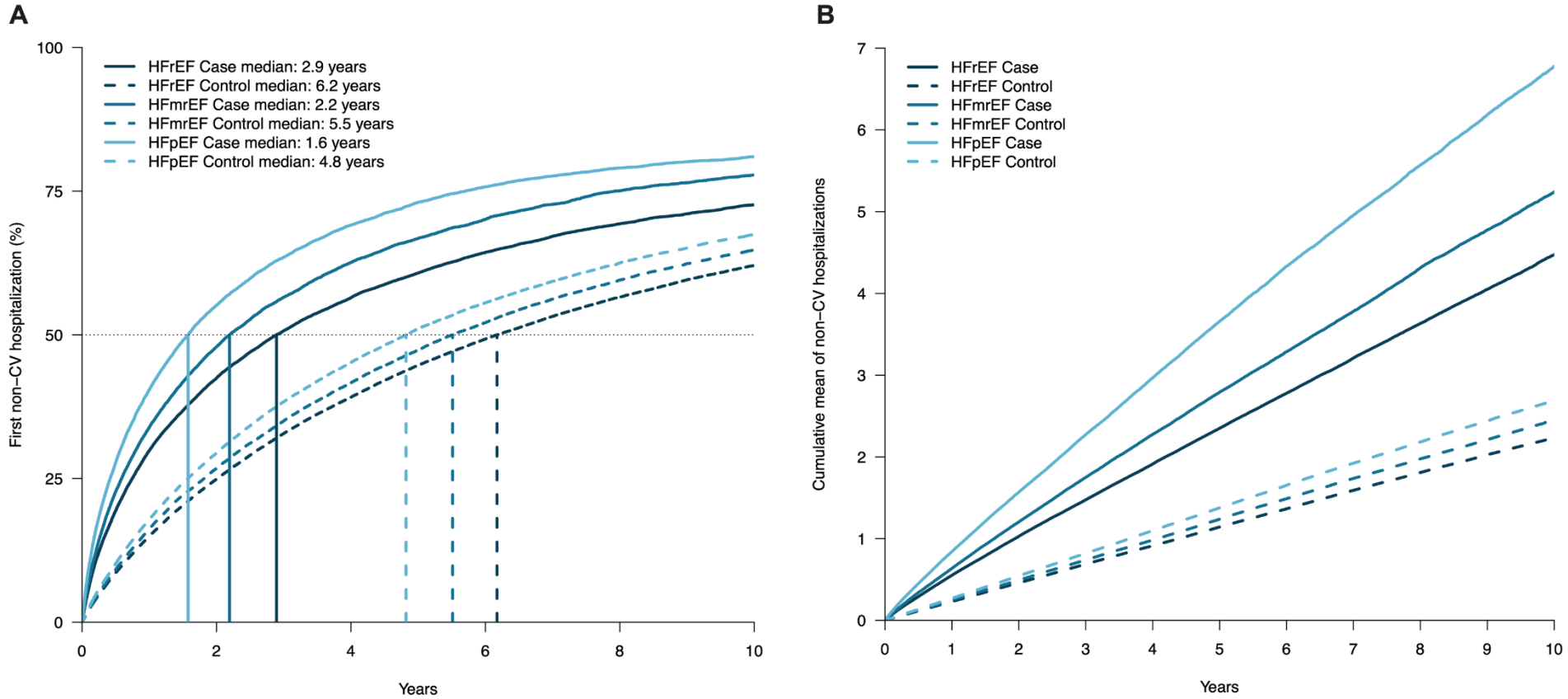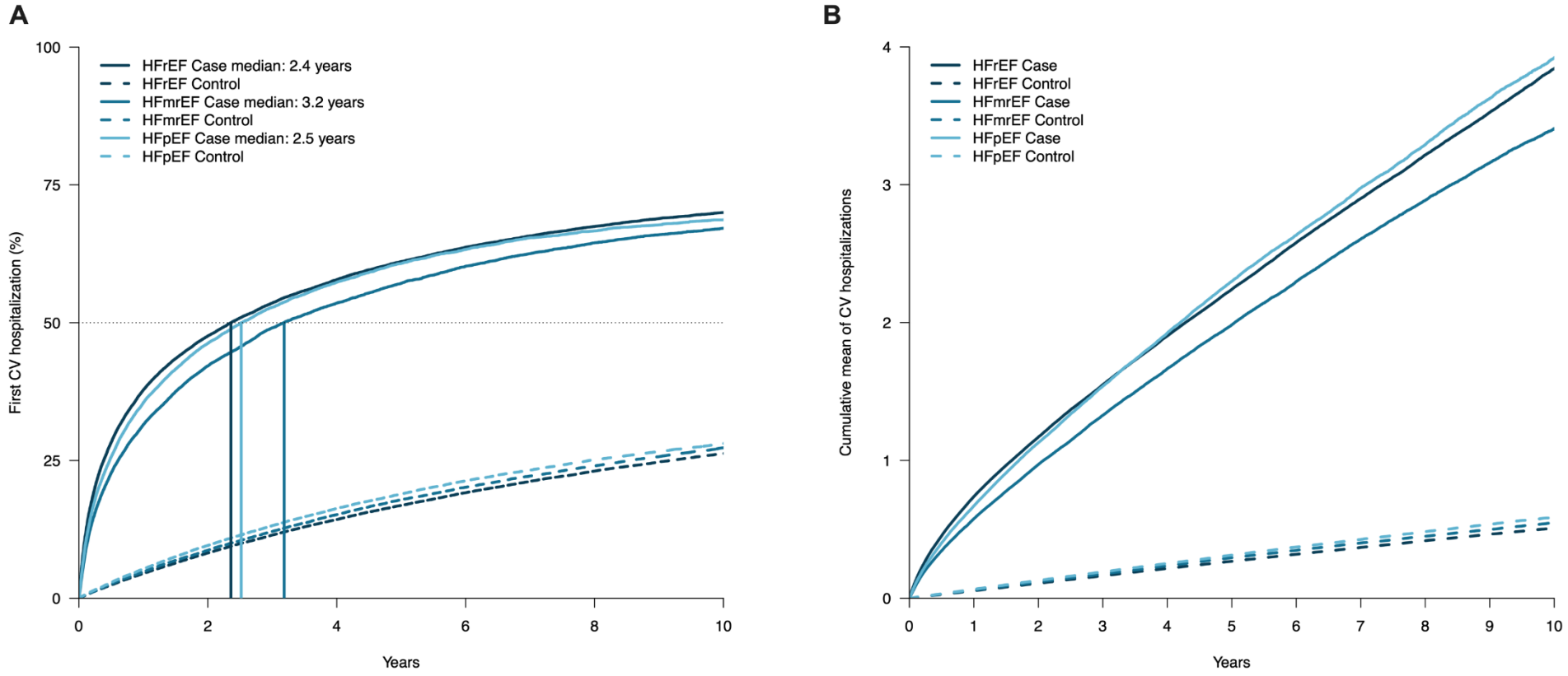

HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction.

Figure S2. Incidence of first all-cause hospitalization (panel A) and mean cumulative all-cause hospitalizations (panel B) across the ejection fraction categories and compared with controls.

HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction.

Figure S3. Incidence of first non-cardiovascular hospitalization (panel A) and mean cumulative non-cardiovascular hospitalizations (panel B) across the ejection fraction categories and compared with controls.
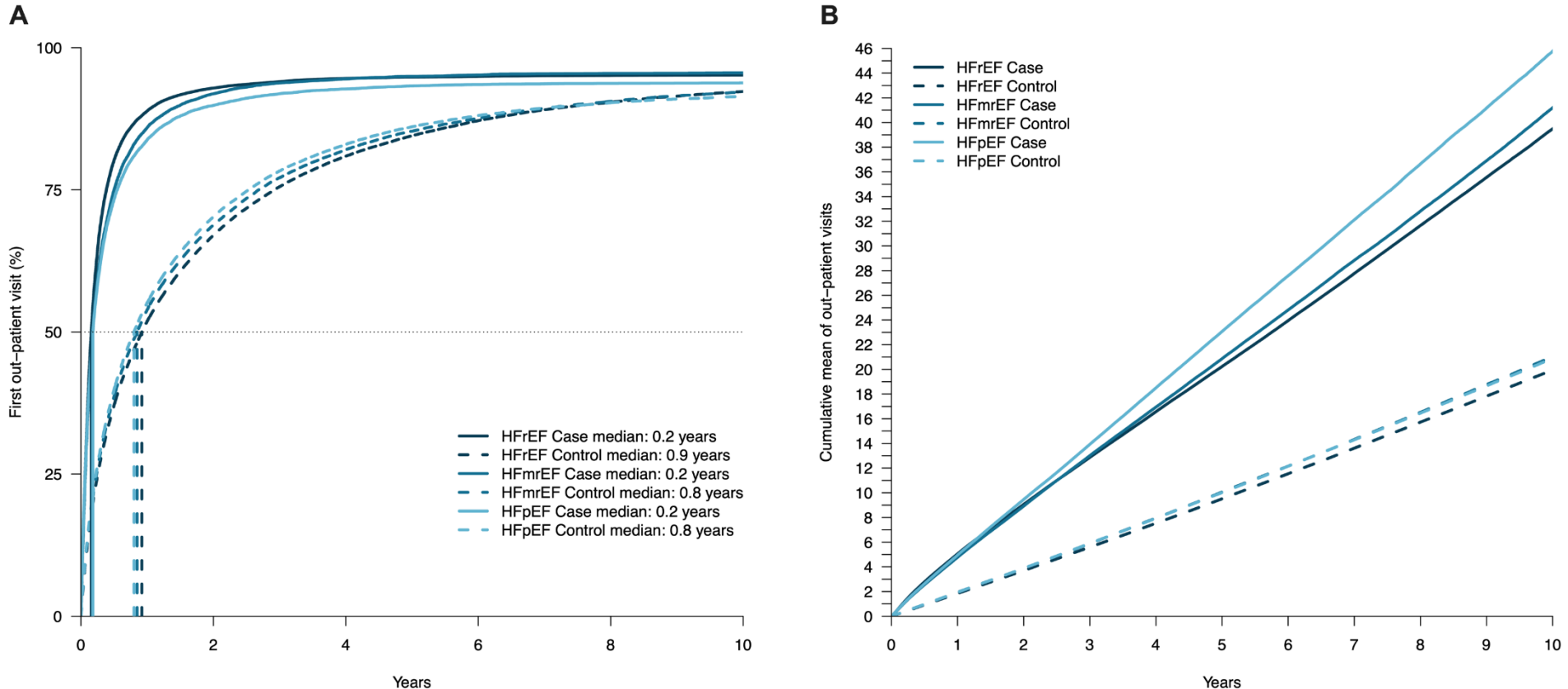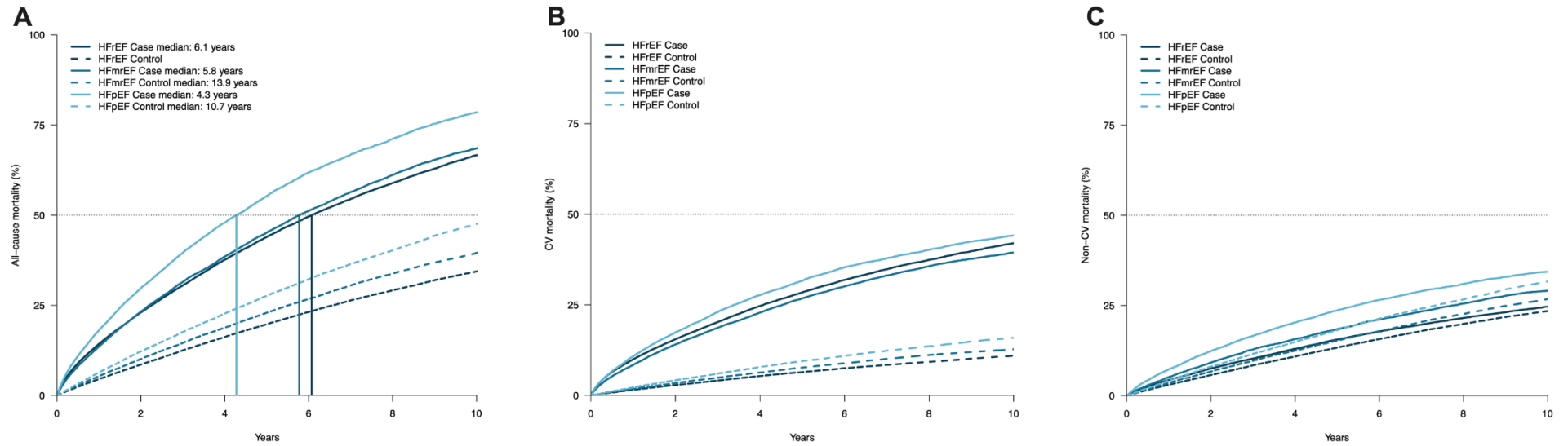

CV = cardiovascular; HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction.

Figure S4. Incidence of first cardiovascular hospitalization (panel A) and mean cumulative cardiovascular hospitalizations (panel B) across the ejection fraction categories and compared with controls.

CV = cardiovascular; HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction.

Figure S5. Incidence of first all-cause outpatient visit (panel A) and mean cumulative all-cause outpatient visits (panel B) across the ejection fraction categories and compared with controls.

HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction

Figure S6. Kaplan Meier curves for the all-cause mortality (panel A), cardiovascular mortality (panel B) and non-cardiovascular mortality (panel C) outcome across the ejection fraction categories and compared with controls.

CV = cardiovascular; HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction.