Supplement

Table 1s Beta-blocker uses in contemporary trails or cohorts for heart failure patients with atrial fibrillation

Study	Year	Study type	Sample size	Inclusion Criteria	LVEF of HF patients with AF	Beta-blocker doses in HF patients with AF	Did beta-blockers improve survival?
BB-meta-HF[1-3]	2014, 2017, and 2018	Meta-analysis of trails	18254 (3006 for AF)	HF	27% (22%–33%), 146 had a LVEF 40–50%, and 73 had a LVEF > 50%	73% achieved target dose	No
Swedish Heart Failure Registry[4]	2015	Observational	18858 (7392 for AF)	HFrEF	All <40%	28% achieved target dose	Yes
Denmark National Patient Registry[5]	2016	Observational	205174 (23896 for HF)	AF	NA	NA	Yes
AF-CHF[6]	2017	Observational	1376	HFrEF with AF	All < 35%	NA	Yes
ESC-HF Long-Term Registry[7]	2018	Observational	2019 (797 for AF)	HF	38% (27.5%–50%), 300 had a LVEF > 40%	17.7% achieved the target dose	Yes
MECKI[8]	2018	Observational	965	HFrEF with permanent AF	All < 40%	14.9% achieved 50% of the target dose	Yes
KorAHF[9]	2019	Observational	2932 (826 for AF)	HFrEF	All <40%	The median in percentage target dose was 21%.	Yes
Southern Medical University[10]	2020	Observational	191	HFpEF with AF	All ≥ 50%	The median in percentage target dose were 25% and 12.8% for bisoprolol and metoprolol, respectively.	Yes

AF: atrial fibrillation; AF-CHF: Atrial Fibrillation and Congestive Heart Failure trial; APPROACH: Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease Heart Alert registry; BB-meta-HF: Beta-Blockers in Heart Failure Collaborative Group; HF: heart failure; HFrEF: heart failure patients with reduced ejection fraction; HFpEF: heart failure patients with preserved ejection fraction; KorAHF: Korean Acute Heart Failure; LVEF: Left ventricular ejection fraction; MECKI: Metabolic Exercise Cardiac Kidney Index score database.

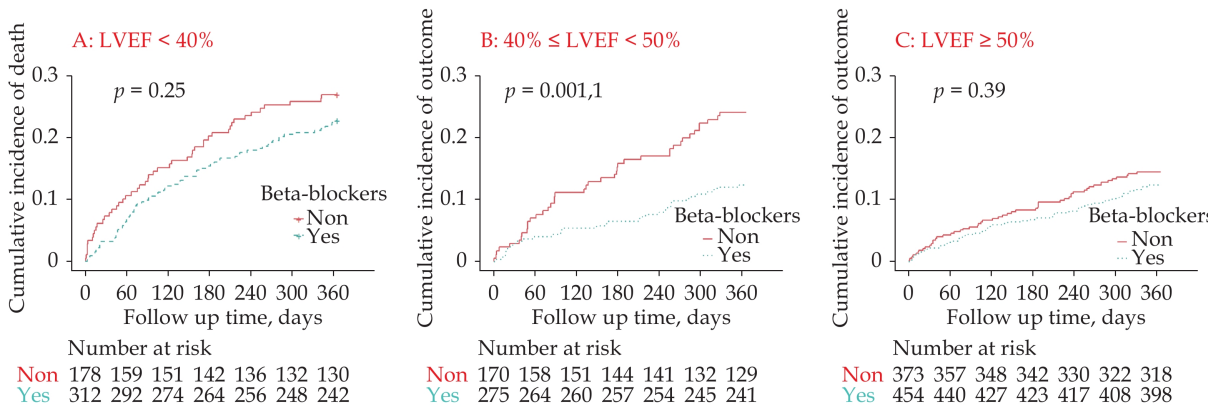

Figure 1S Cumulative incidence of 1-year all-cause death by the use of beta-blockers at discharge, across the different levels of left ventricular ejection fraction. Subgroup analyses of left ventricular ejection fraction (A: <40%; B: 40–49%; C: ≥50%). LVEF: Left ventricular ejection fraction.

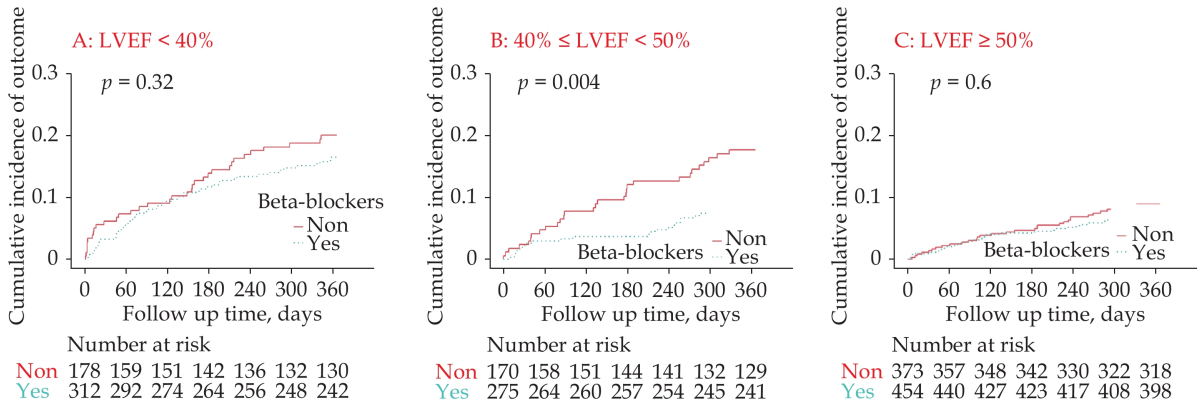

Figure 2S Cumulative incidence of 1-year cardiovascular death by the use of beta-blockers at discharge, across the different levels of left ventricular ejection fraction. Subgroup analyses of left ventricular ejection fraction (A: < 40%; B: 40–49%; C: ≥ 50%). LVEF: Left ventricular ejection fraction.

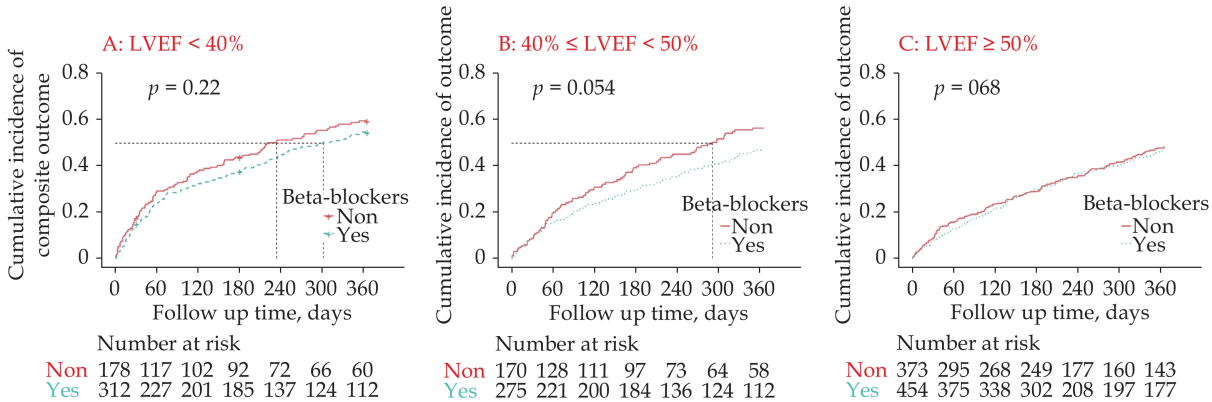

Figure 3S Cumulative incidence of 1-year composite outcome of all-cause death and heart failure rehospitalization by the use of beta-blockers at discharge, across the different levels of left ventricular ejection fraction. Subgroup analyses of left ventricular ejection fraction (A: <40%; B: 40–49%; C: ≥50%). LVEF: Left ventricular ejection fraction.

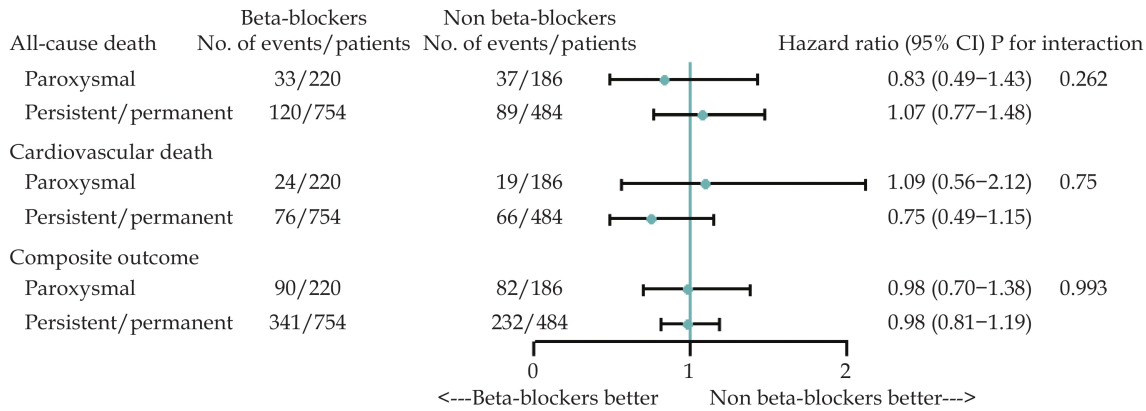

Figure 4S Associations between the use of beta-blockers at discharge and 1-year clinical outcomes according to classifications of atrial fibrillation.

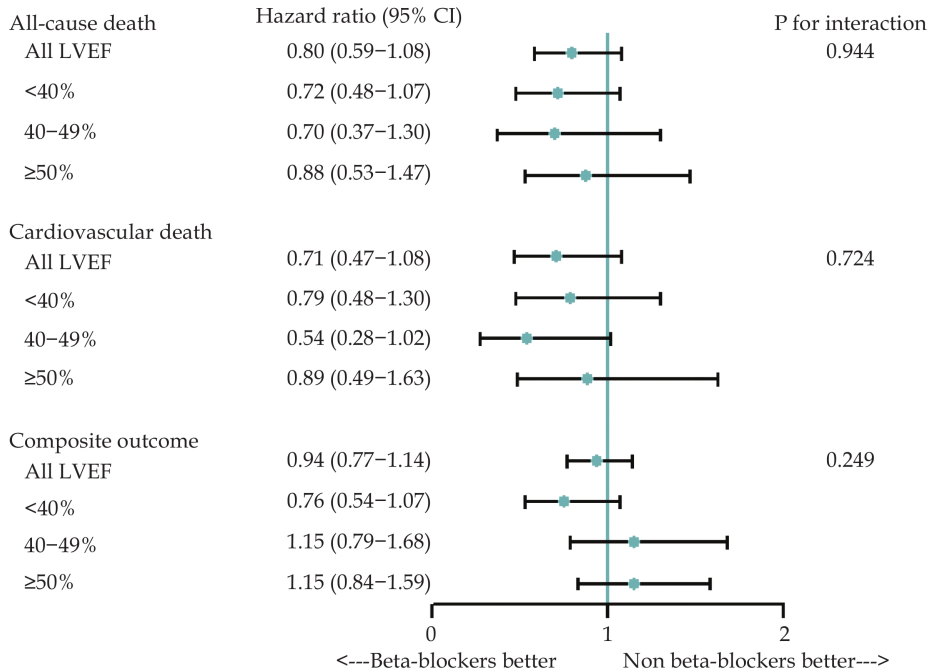

Figure 5S First sensitivity analysis, associations between the use of beta-blockers at discharge and 1-year clinical outcomes among those not changing discharge beta-blocker status during follow-up (*n* = 1290). This analysis excludes 472 participants who did not receive beta-blockers at discharge who had documented beta-blocker use during medication reconciliation at any follow-up visit (*n* = 227) and those who received beta-blockers at discharge who had follow-up visits at which medication reconciliation documented no beta-blocker use (*n* = 245). In total, 1290 eligible patients were included in this sensitive analysis. LVEF: left ventricular ejection fraction.

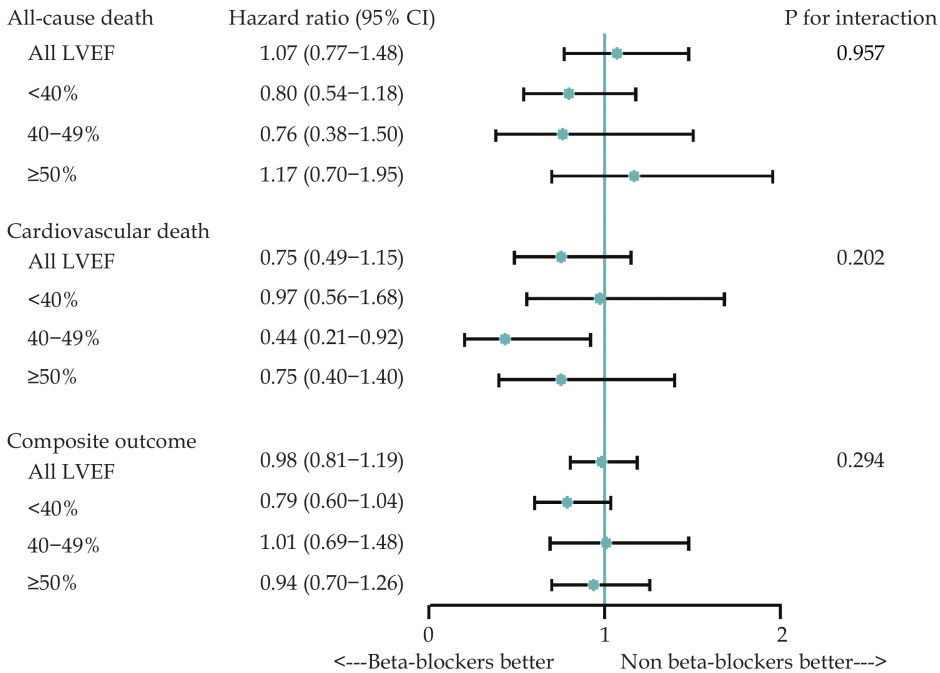

Figure 6S Fourth sensitivity analysis, associations between the use of beta-blockers at discharge and 1-year clinical outcomes among those whose heart rhythm was atrial fibrillation at discharge (n=1345). This analysis excludes the 417 participants who had no document of heart rhythm at discharge (*n* = 63) and those who had sinus rhythm or paced rhythm at discharge (*n* = 354). In total, 1345 eligible patients were included in this sensitive analysis. LVEF: left ventricular ejection fraction.

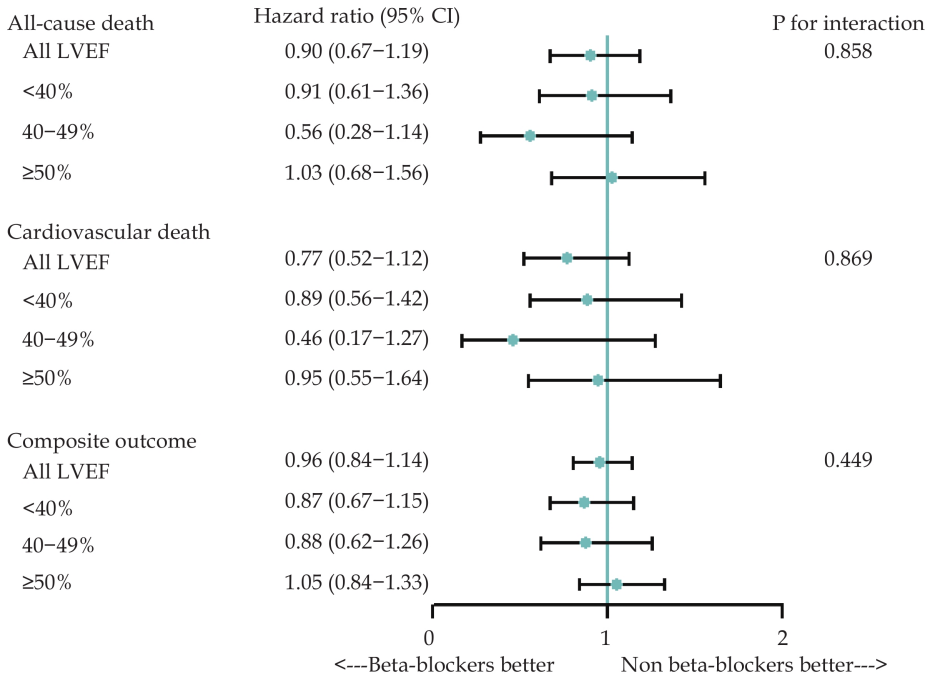

Figure 7S Second sensitivity analysis, associations between the use of beta-blockers at discharge and 1-year clinical outcomes among those who were persistent/permanent atrial fibrillation (*n* = 1238). This analysis excludes 524 participants who had no classification of atrial fibrillation (*n* = 118) and those who were paroxysmal atrial fibrillation (*n* = 406). In total, 1238 eligible patients were included in this sensitive analysis. LVEF: left ventricular ejection fraction.

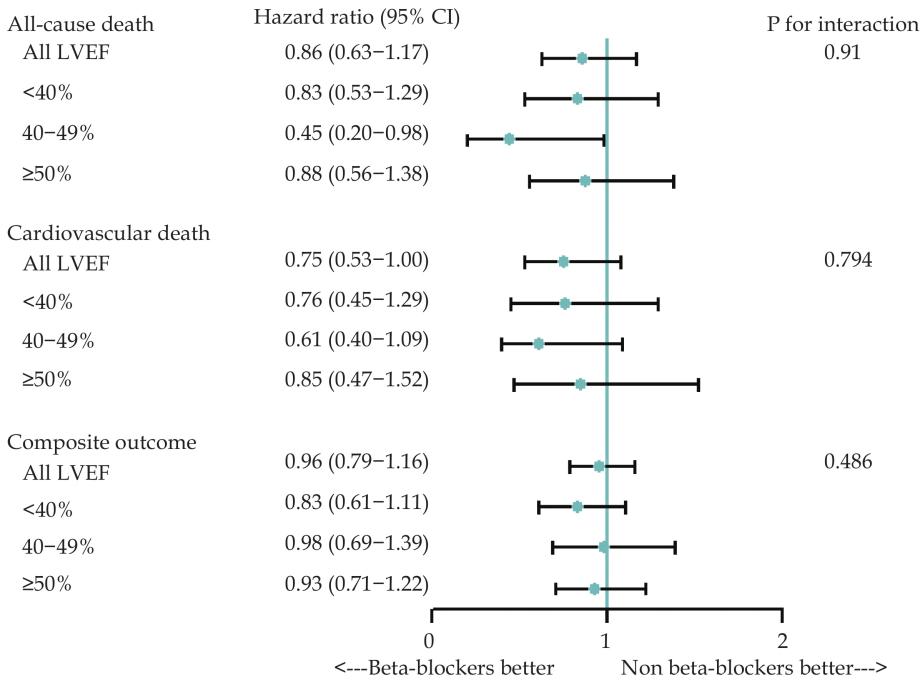

Figure 8S Third sensitivity analysis, associations between the use of beta-blockers at discharge and 1-year clinical outcomes among those who had no rhythm control treatment during hospitalization or at discharge (*n* = 1580). This analysis excludes the 182 participants who had antiarrhythmic agents (including amiodarone, sotalol, and propafenone) or radiofrequency ablation for atrial fibrillation during hospitalization or at discharge. In total, 1580 eligible patients were included in this sensitive analysis. LVEF: left ventricular ejection fraction.

Definition of the variables in the medical history

The diagnosis criteria of laboratory were defined as HbA1c ≥ 6.5% for diabetes mellitus, low-density lipoprotein cholesterol ≥ 3.37 mmol/L (130 mg/dL) for low-density lipoprotein cholesterol elevation, estimation of glomerular filtration rate < 60 mL/min per l.73 m^2 for reduced renal function.

Non-ischemic cardiomyopathy included dilated, alcoholic, tachycardia, hypertrophic, restrictive, right ventricular arrhythmic, stress, drug-induced, or perinatal cardiomyopathy, noncompaction of ventricular myocardium, and cardiomyopathy of amyloidosis. Valvular heart disease included mitral, aortic, tricuspid, pulmonary, or multiple valve diseases; rheumatic or nonrheumatic valve disorders; moderate or severe valvular lesions.

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