Supplementary Table 1. Evaluation of risk of bias for included studies using Newcastle-Ottawa Scale

Studies	Selection				Comparability	Outcome		
	Exposed	Non-exposed	Exposure	Outcome at onset		Outcome	Follow-up length	Follow-up adequacy
Toma M[6]	-	*	*	-	**	*	-	-
Margolis G[12]	-	*	*	-	**	*	-	-
Pascual-Figal DA[14]	-	*	*	*	*	*	*	*
Shah KS [16]	-	*	*	*	**	*	*	*
Farré N[18]	-	*	*	*	**	*	*	-
Farmakis D[20]	-	*	*	*	**	*	-	-
Koh AS[21]	-	*	*	*	**	*	*	*
Wang K[26]	-	*	*	*	*	*	*	-
Delepaul B[27]	-	*	*	-	*	*	*	*
Choi KH[13]	-	*	*	*	**	*	*	-
Lam CSP[4]	-	*	*	*	**	*	*	*
Guisado-Espartero ME[15]	-	*	*	*	**	*	*	-
Lund LH[23]	-	*	*	*	**	*	*	*
Avula HR[24]	-	*	*	*	**	*	*	*
Miro O[25]	-	*	*	*	*	*	*	-
Borovac JA[11]	-	*	*	-	**	*	*	-
Miró Ò[17]	-	*	*	*	**	*	-	*
Shiga T[19]	-	*	*	-	*	*	*	-
Siontis GC[22]	-	*	*	*	**	*	*	*

Supplementary Table 2. Sensitivity analysis of LAM (HFpEF *vs.* HFmrEF)

Removed research	HR (95%CI) after removing	*P* values after removing	I^2 after removing (%)
Borovac JA 2019	1.06 (1.00-1.13)	0.0070	55
Choi KH 2018	1.07 (0.99-1.15)	0.0004	65
Lam CSP 2018	1.08 (1.01-1.16)	0.0009	63
Pascual-Figal DA 2017	1.07 (0.99-1.15)	0.0004	65
Shah KS 2017	1.09 (1.00-1.19)	0.0020	61
Farré N 2017	1.08 (1.00-1.17)	0.0003	66
Shiga T 2019	1.07 (1.00-1.16)	0.0003	66
Koh AS 2017	1.08 (0.99-1.18)	0.0003	65
Guisado-Espartero ME 2018	1.09 (1.01-1.17)	0.0006	64
Siontis GC 2019	1.04 (0.98-1.10)	0.0400	44
Lund LH 2018	1.08 (1.01-1.17)	0.0003	66
Avula HR 2018	1.08 (1.00-1.18)	0.0003	66
Miro O 2018	1.08 (1.00-1.16)	0.0003	66
Wang K 2017	1.07 (0.99-1.14)	0.0007	63
Delepaul B 2017	1.08 (1.00-1.15)	0.0003	66

Supplementary Table 3. Sensitivity analysis of LAM (HFrEF *vs.* HFmrEF)

Removed research	HR (95%CI) after removing	*P* Value after removing	I^2 after removing (%)
Borovac JA 2019	0.81 (0.74-0.89)	<0.0001	70
Choi KH 2018	0.79 (0.72-0.87)	<0.0001	71
Lam CSP 2018	0.80 (0.73-0.88)	<0.0001	72
Pascual-Figal DA 2017	0.79 (0.72-0.87)	<0.0001	69
Shah KS 2017	0.79 (0.72-0.87)	<0.0001	70
Farré N 2017	0.79 (0.72-0.87)	<0.0001	70
Shiga T 2019	0.80 (0.73-0.88)	<0.0001	71
Koh AS 2017	0.79 (0.71-0.88)	0.0001	68
Guisado-Espartero ME 2018	0.81 (0.74-0.89)	<0.0001	71
Siontis GC 2019	0.83 (0.76-0.90)	0.0003	65
Lund LH 2018	0.83 (0.76-0.90)	0.001	61
Avula HR 2018	0.80 (0.71-0.90)	0.0001	70
Miro O 2018	0.80 (0.72-0.88)	<0.0001	71
Wang K 2017	0.82 (0.75-0.90)	<0.0001	67
Delepaul B 2017	0.80 (0.73-0.88)	<0.0001	72

Supplementary Table 4. Begg test and Egger test for publication bias of LAM

Items	*P* value (Begg test)	*P* value (Egger test)
HFpEF *vs.* HFmrEF	0.621	0.246
HFrEF *vs.* HFmrEF	0.428	0.485

Supplementary Table 5. Overview of outcomes and multivariable relationships of LAM, SAM, LHR and LCD

Author	Year	Outcomes	HR and 95% CI for Outcomes	Adjusted covariates
Toma M[6]	2014	SAM	SAM: HFmrEF *vs.* HFpEF (Ref) HR: 0.78 (0.49-1.24) HFmrEF *vs.* HFrEF (Ref) HR: 0.9286 (0.4935-1.7471)	Age, sex and EF
Margolis G[12]	2017	SAM	SAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.4 (1.02-1.95) HFmrEF *vs.* HFrEF (Ref) HR: NA	Age, gender, hypertension, diabetes mellitus, CAD severity, dyslipidemia, smoking status and past MI
Pascual-Figal DA[14]	2017	LAM/LCD	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.26 (0.90-1.75) HFmrEF *vs.* HFrEF (Ref) HR: 1.06 (0.83-1.36) LCD: HFmrEF *vs.* HFpEF (Ref) HR: 1.71 (1.13-2.57) HFmrEF *vs.* HFrEF (Ref) HR: 1.01 (0.76-1.34)	Cannot be found
Shah KS [16]	2017	LAM/LHR	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.26 (0.90-1.75) HFmrEF *vs.* HFrEF (Ref) HR: 1.06 (0.83-1.36) LHR: HFmrEF *vs.* HFpEF (Ref) HR: 1.71 (1.13-2.57) HFmrEF *vs.* HFrEF (Ref) HR: 1.01 (0.76-1.34)	Demographics (age, sex, and race/ethnicity), medical history (anemia, ischemic etiology, cerebrovascular accident/transient ischemic attack, diabetes, [insulin and noninsulin treated], hyperlipidemia, hypertension, chronic obstructive pulmonary disease, [COPD] or asthma, peripheral vascular disease, renal insufficiency, smoking), examination/laboratory results (heart rate, systolic blood pressure, body mass index, creatinine, sodium, blood urea nitrogen, and hemoglobin at admission), year and quarter of index admission, and hospital characteristics (geographic region, teaching status of hospital, number of beds, and rural location).

Farré N[18]	2017	LAM/LHR/ LCD	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.00000 (0.83533-1.19713) HFmrEF *vs.* HFrEF (Ref) HR: 0.93 (0.80-1.08) LCD: HFmrEF *vs.* HFpEF (Ref) HR:1.06667 (0.80987-1.40489) HFmrEF *vs.* HFrEF (Ref) HR: 0.80 (0.64-1.01) LHR: HFmrEF *vs.* HFpEF (Ref) HR: 0.84746 (0.69221-1.03752) HFmrEF *vs.* HFrEF (Ref) HR: 1.00 (0.84-1.20)	Age, sex and baseline EF
Farmakis D[20]	2017	SAM	SAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.026 (0.605,1.741) HFmrEF *vs.* HFrEF (Ref) HR: 0.635 (0.419-0.963)	Baseline demographic and clinical features, medical history, clinical and laboratory parameters on admission, and in-hospital medications were considered as candidate variables in multivariate analysis
Koh AS[21]	2017	SAM/LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.00000 (0.83533-1.19713) HFmrEF *vs.* HFrEF (Ref) HR: 0.93 (0.8-1.08) SAM: HFmrEF *vs.* HFpEF (Ref) HR: 0.78 (0.49-1.24) HFmrEF *vs.* HFrEF (Ref) HR: 0.9286 (0.4935-1.7471)	Age, sex, index year, type of care, living alone, education, systolic blood pressure, heart rate, diabetes, CAD, atrial fibrillation, lung disease, valve disease, anaemia, eGFR, ACEI or ARB, Beta-blockers, diuretics, statins,
Wang K[26]	2017	LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.55(0.95-2.53) HFmrEF *vs.* HFrEF (Ref) HR: 0.53819(0.38460-0.75312)	Cannot be found
Delepaul B[27]	2017	LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.00000(0.59886-1.66983)	Age

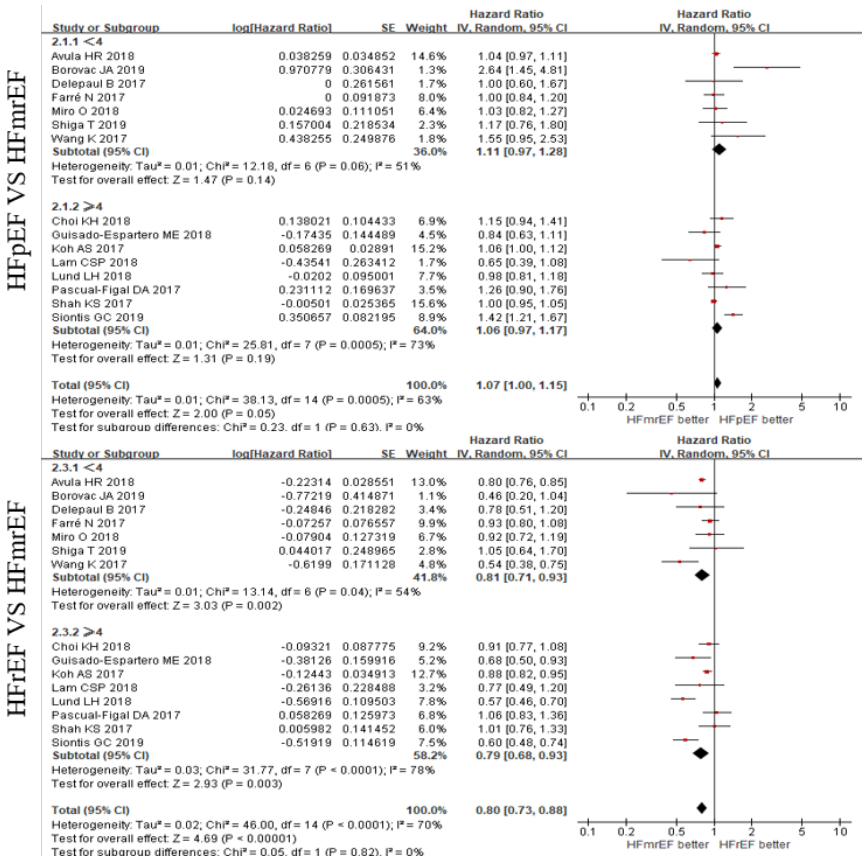
			HFmrEF *vs.* HFrEF (Ref) HR: 0.780(0.510-1.200)	
Choi KH[13]	2018	LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.00000(0.59886-1.66983) HFmrEF *vs.* HFrEF (Ref) HR: 0.780(0.510-1.200)	Age, sex, presence of hypertension, diabetes mellitus, atrial fibrillation, ischaemic aetiology, NYHA grade ⩾3, SBP<100mmHg and creatinine ⩾2.0mg/dL
Lam CSP[4]	2018	LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 0.64706(0.38608-1.08444) HFmrEF *vs.* HFrEF (Ref) HR: 0.77(0.49-1.20)	Age, sex, history of hypertension and diabetes, aetiology (ischaemic or non-ischaemic), NYHA class, AF, SBP, HR, LBBB, and log(creatinine), logNT-proBNP
Guisado-Espartero ME[15]	2018	SAM/LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 0.84 (0.63-1.11) HFmrEF *vs.* HFrEF (Ref) HR: 0.68293(0.49923-0.93422) SAM: HFmrEF *vs.* HFpEF (Ref) HR: 0.76(0.29-1.96) HFmrEF *vs.* HFrEF (Ref) HR:0.49673(0.17843-1.38288)	Age, sex, history of atrial fibrillation or prior myocardial infarction, anaemia, NYHA class III-IV, body mass index >25 kg/m^2 and estimated glomerular filtration rate <60 ml/min
Lund LH[23]	2018	LAM/LHR/LCD	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 0.98(0.82-1.19) HFmrEF *vs.* HFrEF (Ref) HR: 0.56647(0.45680-0.70248) LCD: HFmrEF *vs.* HFpEF (Ref) HR: 1.21 (0.98-1.51) HFmrEF *vs.* HFrEF (Ref) HR: 0.55000 (0.43111-0.70167) LHR: HFmrEF *vs.* HFpEF (Ref) HR: 0.94 (0.78-1.13) HFmrEF *vs.* HFrEF (Ref) HR: 0.66197(0.53333-0.82165)	Adjusted for sex, ethnicity, New York Heart Association class, systolic blood pressure, HF cause (ischaemic, idiopathic, hypertension), previous HF admission, atrial fibrillation, stroke, diabetes mellitus, smoking, and cancer, and stratified by candesartan, age (years) and body mass index (deciles). For recurrent HF model, candesartan, age, and body mass index deciles were included as covariates.
Avula HR[24]	2018	LAM/LHR	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.03896(0.97043-1.11233)	Age, gender, Race, Acute myocardial infraction, Coronary bypass, Percutaneous coronary intervention,

			HFmrEF *vs.* HFrEF (Ref) HR: 0.800(0.760-0.850) LHR: HFmrEF *vs.* HFpEF (Ref) HR: 1.13043(1.04001-1.22872) HFmrEF *vs.* HFrEF (Ref) HR: 0.78(0.72-0.83)	Ischemic stroke or transient ischemic attack, Atrial fibrillation or flutter, Ventricular tachycardia or fibrillation, Mitral and/or aortic valvular disease, Peripheral arterial disease, Rheumatic heart disease, Cardiac resynchronization therapy, Implantable cardioverter defibrillator, Pacemaker, Dyslipidemia, Hypertension, Diabetes mellitus, Hospitalized bleed, Diagnosed dementia, Diagnosed depression, Chronic lung disease, Chronic liver disease, Systemic cancer, Systolic blood pressure, Diastolic blood pressure, Baseline estimated glomerular filtration rate, Baseline Dipstick Proteinuria, Baseline hemoglobin, HDL cholesterol, LDL cholesterol, Baseline medication use,
Miro O[25]	2018	LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.025(0.825-1.275) HFmrEF *vs.* HFrEF (Ref) HR: 0.924(0.720-1.186)	Age, Arterial hypertension, Diabetes Mellitus, Dyslipidemia, Ischaemic heart disease, Valvulopathy, Atrial fibrillation, Peripheral arteriopathy, Dementia, Previous episode of AHF, NYHA III–IV, Barthel Index, Diuretics, ACEI-ARA-II, Beta-blockers, ARA, SBP (mmHg), Oxygen saturation, Haemoglobin, Sodium, Potassium, Increased troponin, NT-proBNP, BNP, Electrocardiogram at Emergency Dpt, Emergency treatment
Borovac JA[11]	2019	LAM/LHR	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 2.64 (1.45–4.82) HFmrEF *vs.* HFrEF (Ref) HR: 0.4623(.2002-1.0171)	Age, sex, eGFR, number of acute decompensation events requiring hospitalization prior to current admission,

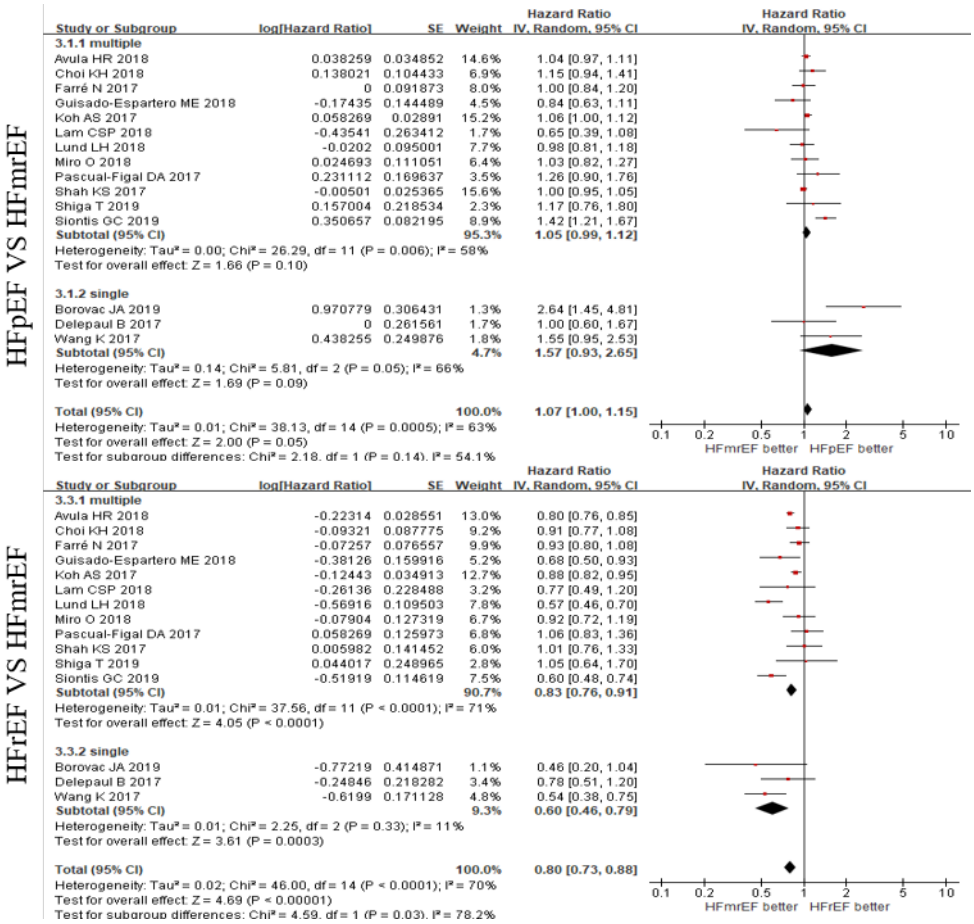
			LHR: HFmrEF *vs.* HFpEF (Ref) HR :2.04 (1.12–3.74) HFmrEF *vs.* HFrEF (Ref) HR: 0.6145 (0.3845-0.9820)	NYHA functional class, DM, SBP, LVEF, urea, uric acid, potassium, sodium and hemoglobin levels in plasma and medications
Miró Ò[17]	2019	SAM	SAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.143(0.841-1.553) HFmrEF *vs.* HFrEF (Ref) HR: 0.835(0.584-0.981)	age, sex, comorbidities (hypertension, diabetes mellitus, ischaemic heart disease, chronic kidney failure, atrial fibrillation, peripheral arterial disease, heart valve disease, prior episodes of acute heart failure), baseline status (Barthel index, NYHA class III-IV), chronic treatments at home (diuretics, angiotensin-converter enzyme inhibitor or angiotensin-receptor blocker, beta-blocker, mineralcorticoid- receptor blocker), vitals at emergency department arrival (systolic blood pressure, air-room pulsioximetry), results of blood tests at emergency department (glucose, creatinine, haemoglobin, potassium, sodium) and management at emergency department (use of intravenous diuretics, nitrates, morphine and inotropic/vasopressor drugs).
Shiga T[19]	2019	LAM	LAM: HFmrEF *vs.* HFpEF (Ref) HR:1.17 (0.76-1.79) HFmrEF *vs.* HFrEF (Ref) HR: 1.04464 (0.64146-1.70125)	age, baseline cardiovascular disease, hypertension, diabetes, dyslipidaemia, hyperuricaemia, chronic obstructive pulmonary disease, impaired renal function, anaemia, and systolic blood pressure
Siontis GC[22]	2019	SAM/LAM /LCD	LAM: HFmrEF *vs.* HFpEF (Ref) HR: 1.420(1.210-1.670) HFmrEF *vs.* HFrEF (Ref) HR: 0.595(0.476-0.746)	age, gender, body mass index, diabetes mellitus, insulin-treatment, diabetes diet or oral treatment at

	SAM: HFmrEF *vs.* HFpEF (Ref) HR:3.49(1.31-9.29) HFmrEF *vs.* HFrEF (Ref) HR: 0.395 (0.200-0.784) LCD: HFmrEF *vs.* HFpEF (Ref) HR: 1.760(1.44-2.15) HFmrEF *vs.* HFrEF (Ref) HR: 0.574(0.400-0.820)	baseline, hypertension, current smoker, family history of CAD, previous MI, previous PCIs, previous CABG, ACS group, renal failure and glycoprotein IIb/IIIa antagonist use at procedure

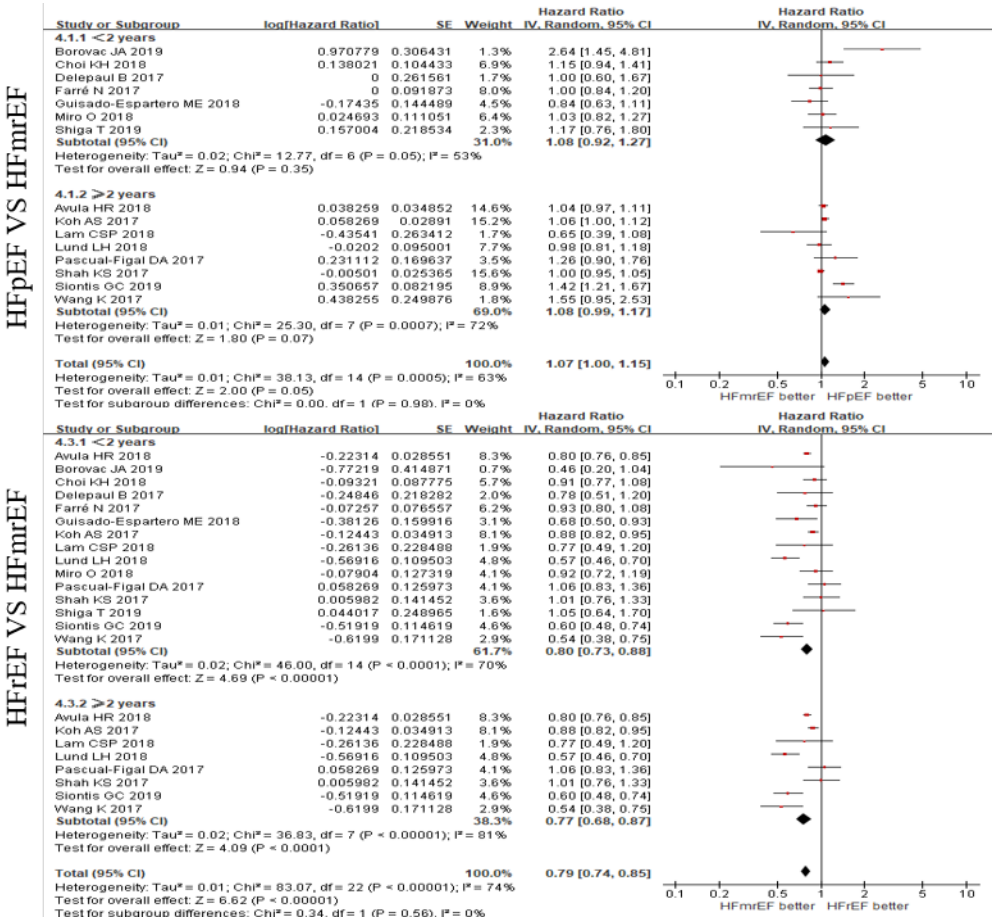
SAM, Short-term all-cause mortality; LAM, long-term all-cause mortality; LCD, long-term cardiovascular death; LHR, long-term HF rehospitalization; N/A: not applicable.; Ref, reference



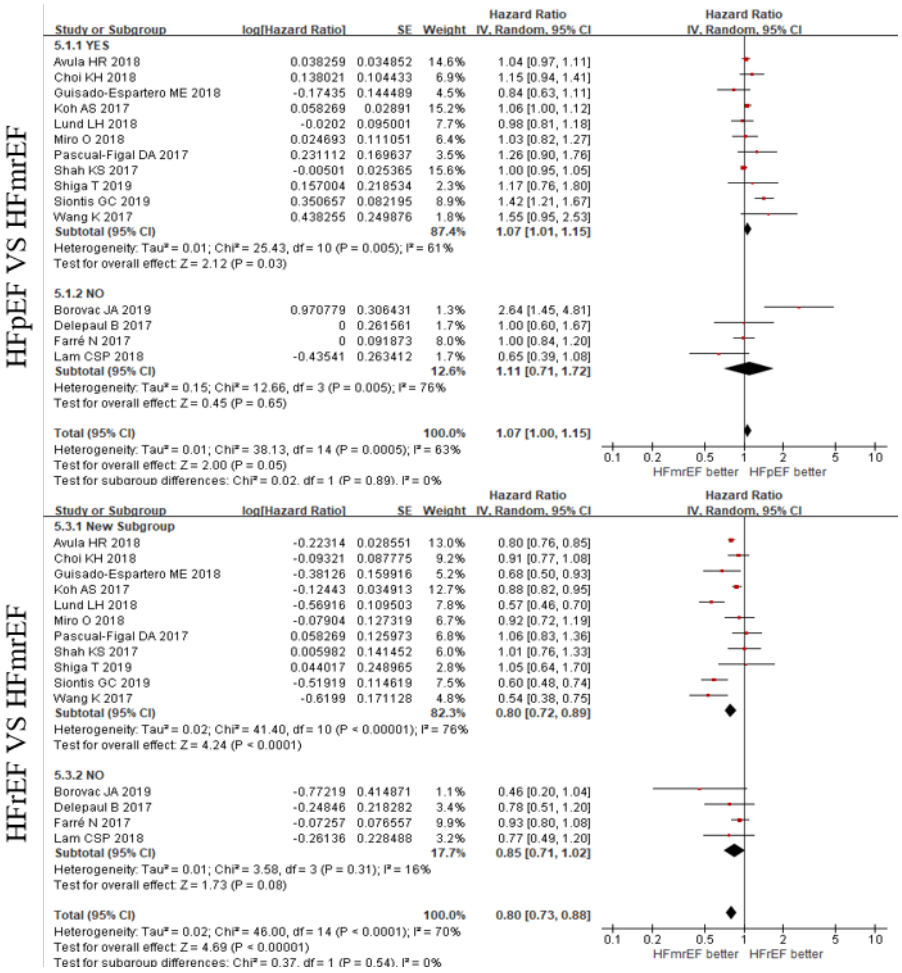
Supplementary Figure 1. Subgroup analysis of impact factors in LAM. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LAM in 15 studies.



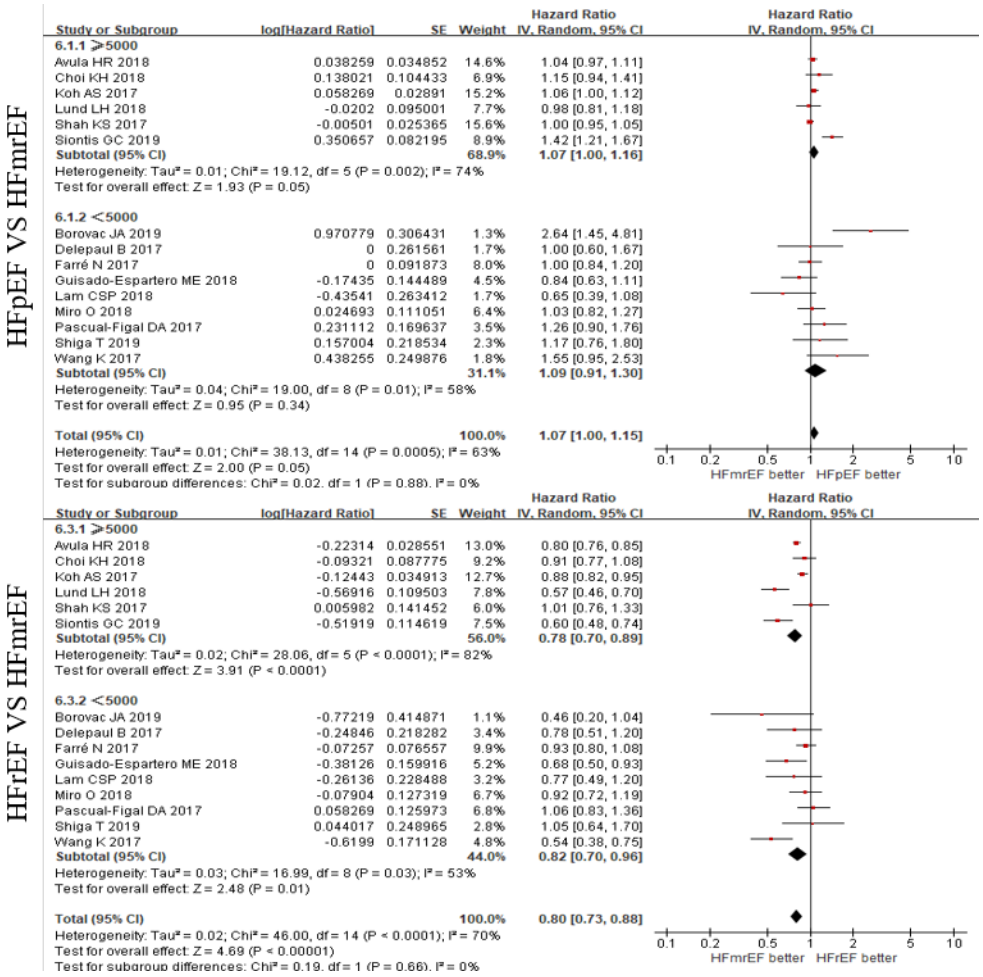
Supplementary Figure 2. Subgroup analysis of scale in LAM. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LAM in 15 studies.



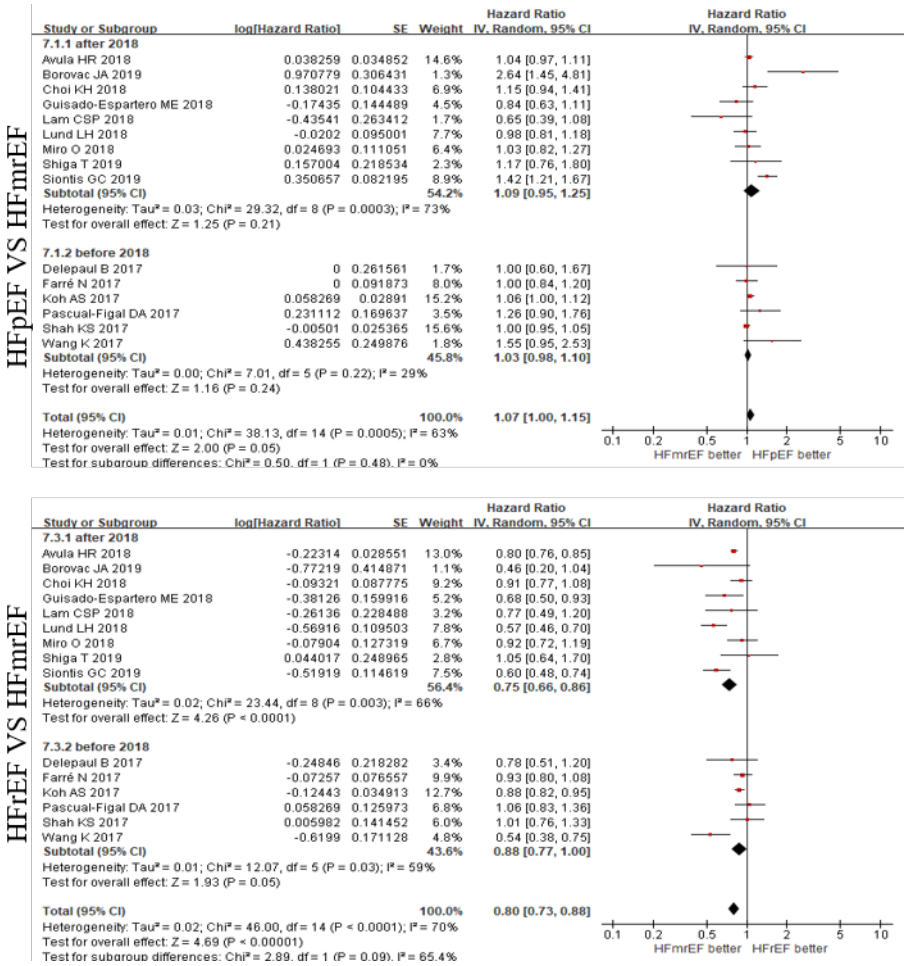
Supplementary Figure 3. Subgroup analysis of follow-up time in LAM. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LAM in 15 studies.



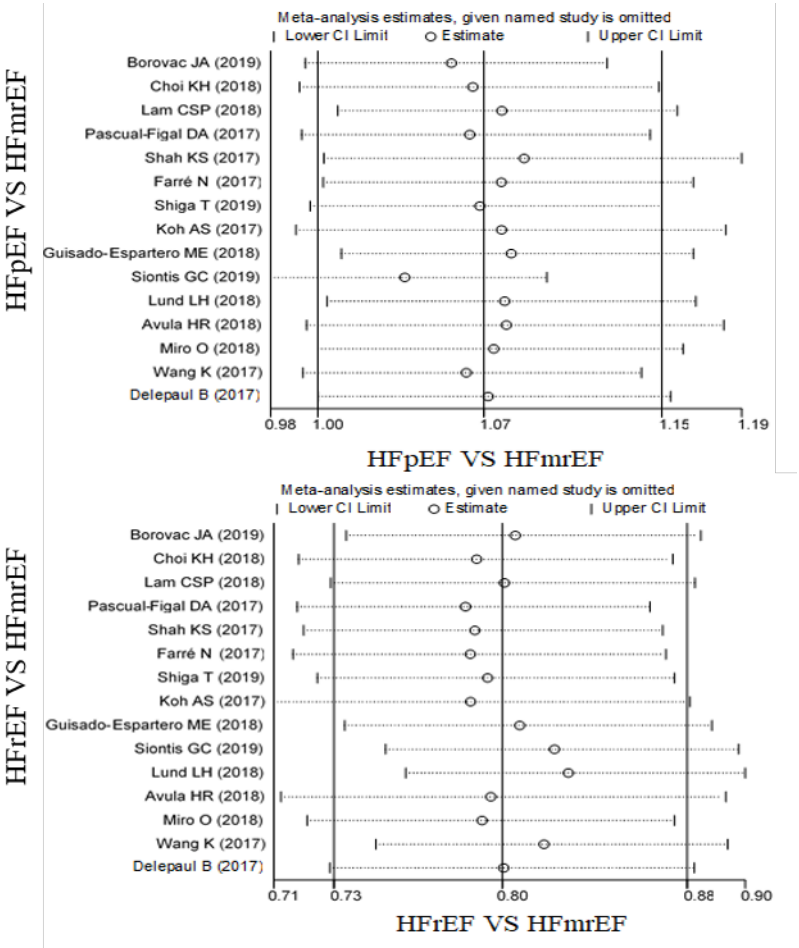
Supplementary Figure 4. Subgroup analysis of fund in LAM. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LAM in 15 studies.



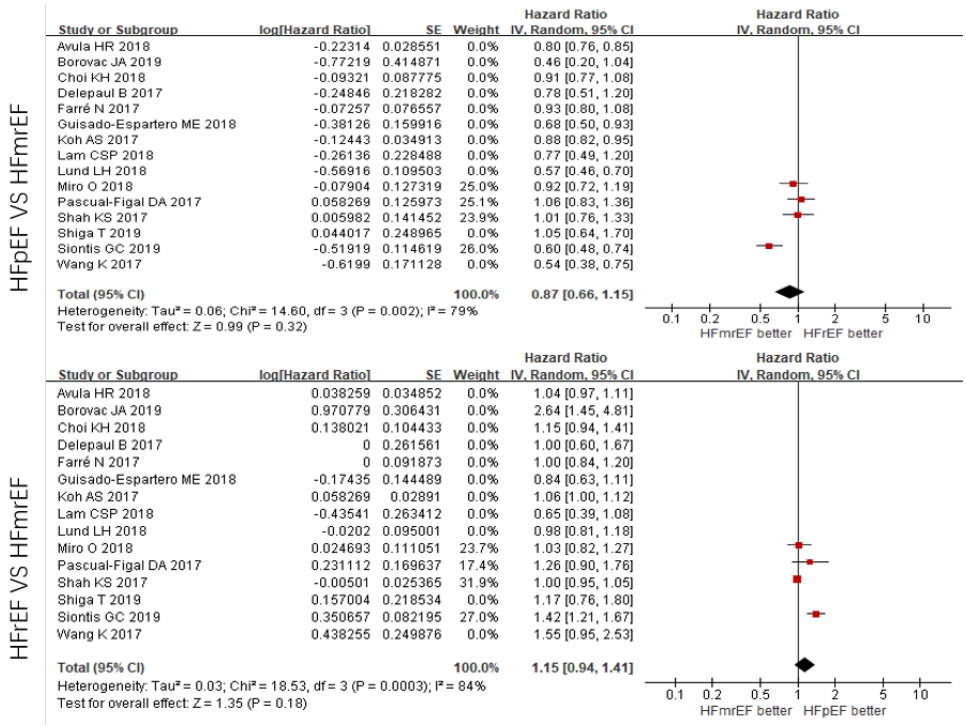
Supplementary Figure 5. Subgroup analysis of sample size in LAM. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LAM in 15 studies.



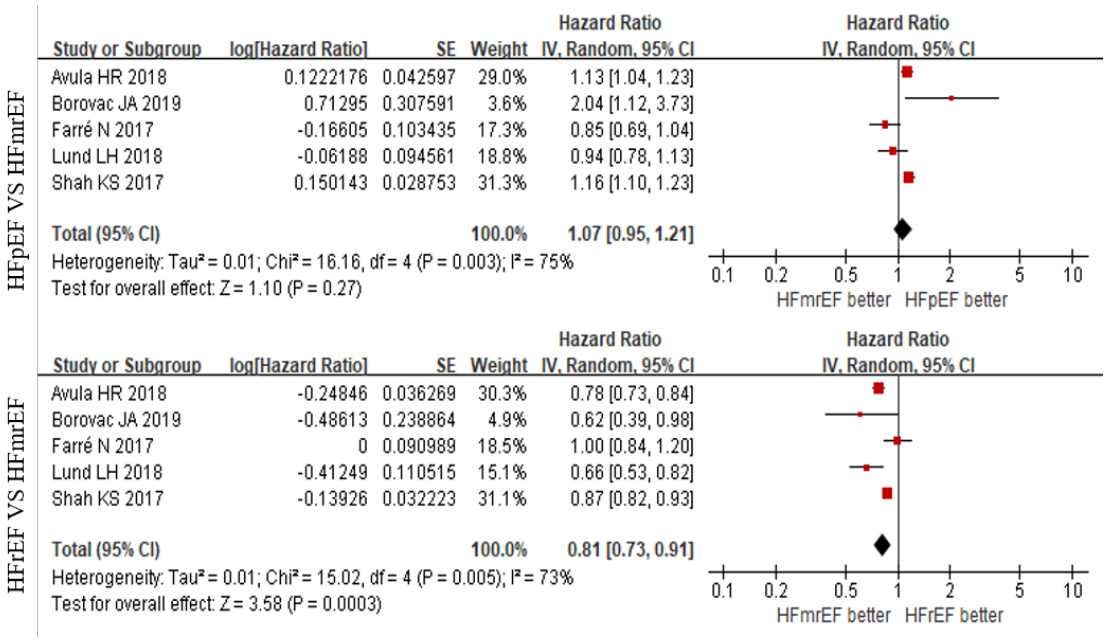
Supplementary Figure 6. Subgroup analysis of publication year in LAM. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LAM in 15 studies.



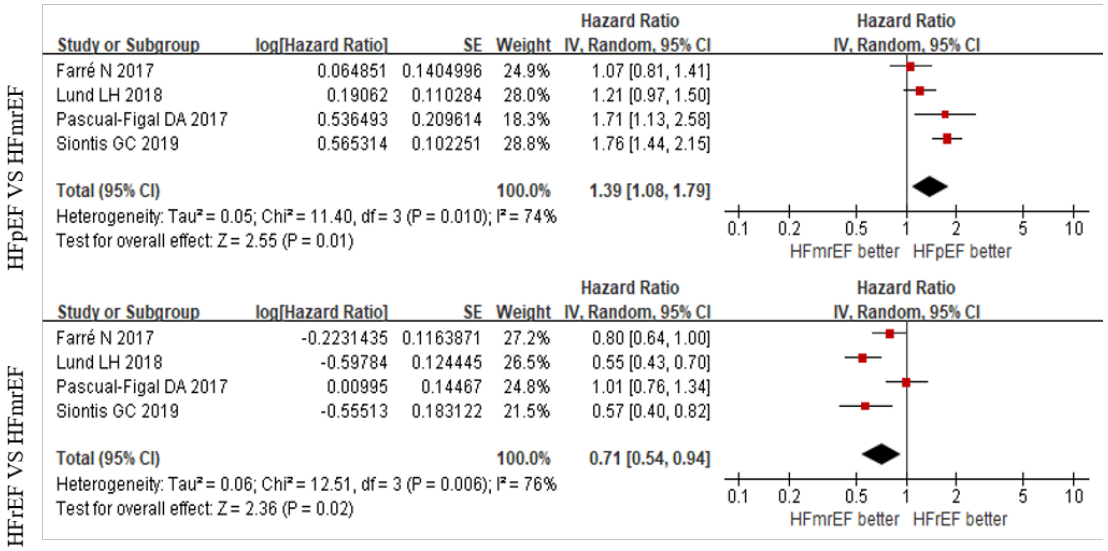
Supplementary Figure 7. Sensitivity analysis for LAM



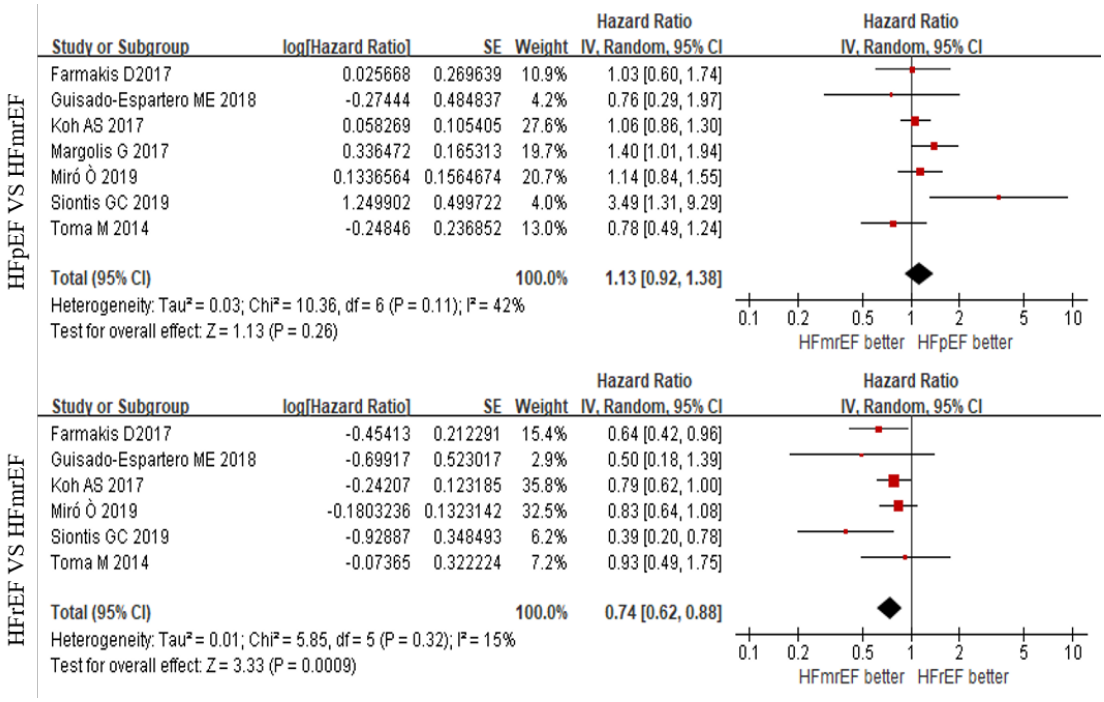
Supplementary Figure 8. Sensitivity analysis for LAM after removing the studies using HR transformation



Supplementary Figure 9. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LHR in 5 studies.



Supplementary Figure 10. Random effects hazard ratio (HR) and 95% confidence interval (CI) for LCD in 4 studies.



Supplementary Figure 11. Random effects hazard ratio (HR) and 95% confidence interval (CI) for SAM in 7 studies.