7th Advances in Heart Failure 2024
10 e 11 de Outubro
FACULDADE DE MEDICINA DA UNIVERSIDADE DO PORTO

DOENÇA CORONÁRIA CRÓNICA

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ULS Coimbra

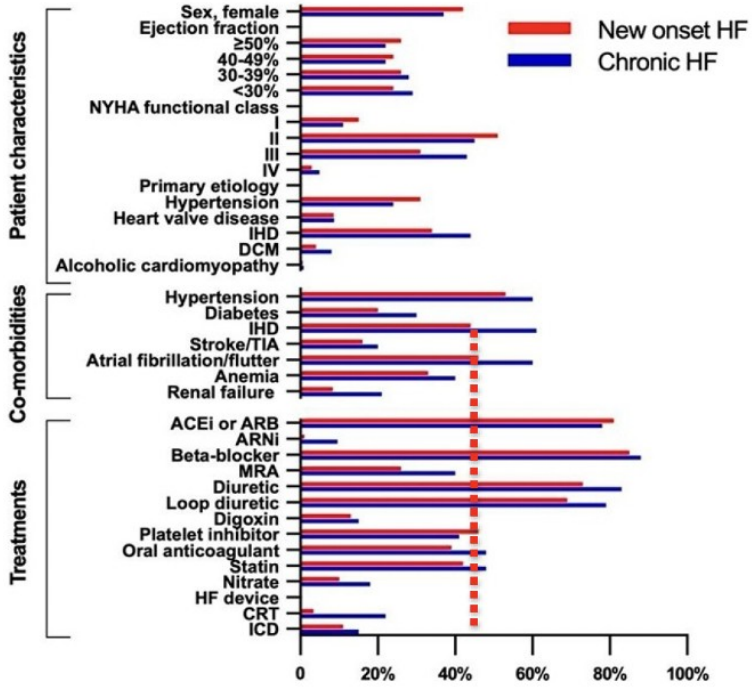
IC DE ETIOLOGIA ISQUÉMICA

Prevalence of Coronary Artery Disease in 26 Multicenter Chronic Heart Failure Trials Reported by the New England Journal of Medicine Since 1986

Trial	Year	N	CAD
VHEFT-1	1986	642	282
CONSENSUS	1987	253	146
Milrinone	1989	230	115
PROMISE	1991	1088	590
SOLVD-T	1991	2569	1828
VHEFT-2	1991	804	427
SOVLD-P	1992	4228	3518
RADIANCE	1993	178	107
Vesnarinone	1993	477	249
STAT-CHF	1995	674	481
Carvedilol	1996	1094	521
PRAISE	1996	1153	732
DIG	1997	6800	4793
VEST	1998	3833	2286
RALES	1999	1663	907
DIAMOND	1999	1518	1017
Nesiritide	2000	127	68
COPERNICUS	2001	2289	1534
BEST	2001	2708	1587
Val-HeFT	2001	5010	2880
MIRACLE	2002	453	108
COMPANION	2004	1520	842
SCD-HeFT	2005	2521	1310
CARE-HF	2005	813	309
RethinQ	2007	172	90
Dronedarone	2008	627	407
Total		**43,444**	**27,074**

62.3%

Figure 1.
Patient characteristics and use of therapy in HF and new onset HF (n= 36,263; 40%) versus chronic HF (n= 54,120; 60%).



Braunwald's textbook of Cardiovascular Medicine 2021

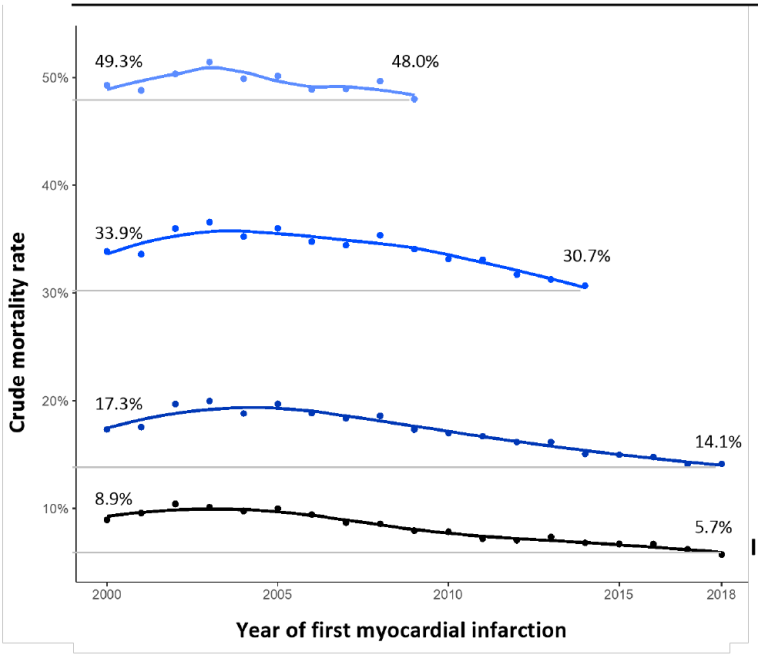
Eur Heart J, 2022:43(2). ehac544.943

MI TRAJECTORY

A population-based study in 22 million individuals

All-cause mortality

Temporal trends



	Hazard ratio for temporal trend [95% CI]
10-year mortality	**0.86 [0.82, 0.90]** Comparing 2009 with 2000
5-year mortality	**0.77 [0.72, 0.82]** Comparing 2014 with 2000
1-year mortality	**0.74 [0.68, 0.81]** Comparing 2018 with 2000
In-hospital mortality	**0.56 [0.48, 0.64]** Comparing 2019 with 2000

- Substantial decline in in-hospital mortality over time
- More modest improvements in long-term survival

Crude mortality rates were calculated as the cumulative incidence of death using Kaplan Meier survival models. Hazard ratios for all-cause mortality were calculated using Cox proportional hazard models and adjusted for age, sex, socioeconomic status, region and baseline cardiovascular comorbidities.

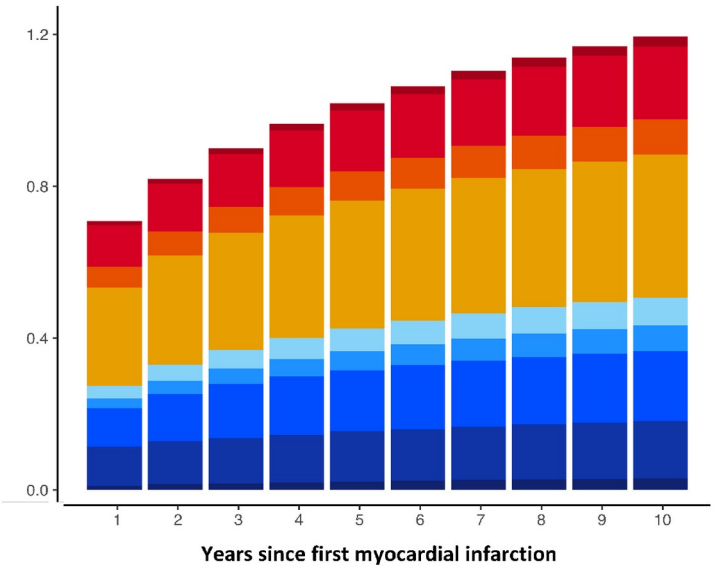
Nathalie Conrad, ESC 2023

MI TRAJECTORY

A population-based study in 22 million individuals

Cardiovascular disease trajectories

Cumulative incidence of secondary cardiovascular disease



Cumulative incidence of secondary cardiovascular disease, 10 years following a first myocardial infarction:

3%	Aortic aneurysm
19%	Atrial fibrillation and flutter
10%	Heart block (second and third degree)
28%	Heart failure
7%	Peripheral artery disease
7%	Stroke
18%	Subsequent myocardial infarction
15%	Valve disease
3%	Venous thromboembolism

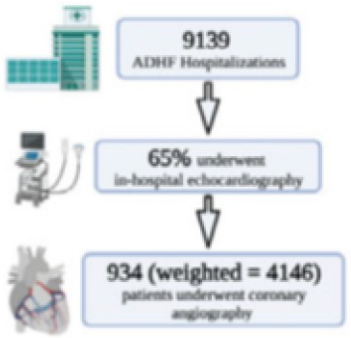
- Most common cardiovascular disease after MI: heart failure, affecting 28% of patients at 10 years
- Subsequent MI: 18%
- Stroke: 7%

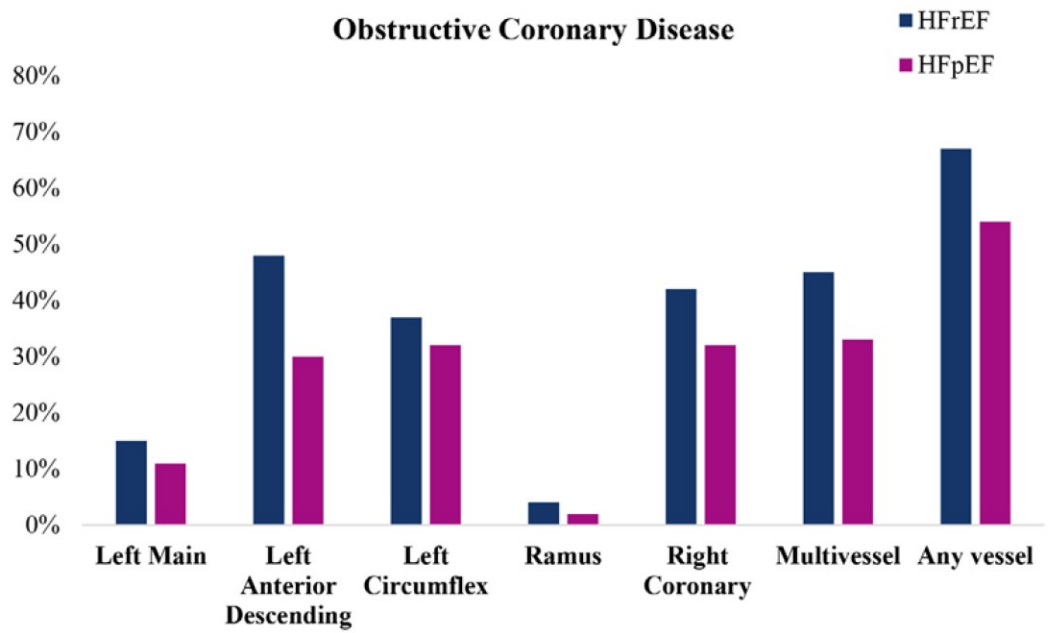
Cumulative incidence of subsequent cardiovascular diseases using Fine and Gray models accounting for the competing risk of death by year since first myocardial infarction. Percentages refer to cumulative incidence of each condition 10 years after first myocardial infarction. Analyses were restricted to patients having survived initial admission. MI = myocardial infarction.

Nathalie Conrad, ESC 2023

AHF: CAD in HFrEF & HFpEF

The ARIC study community surveillance

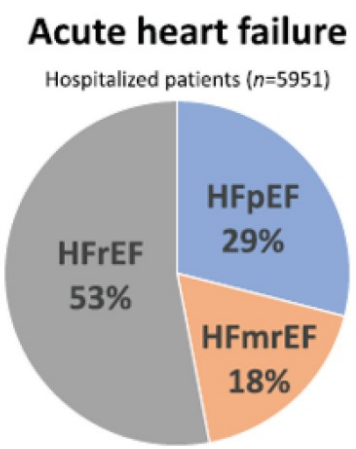




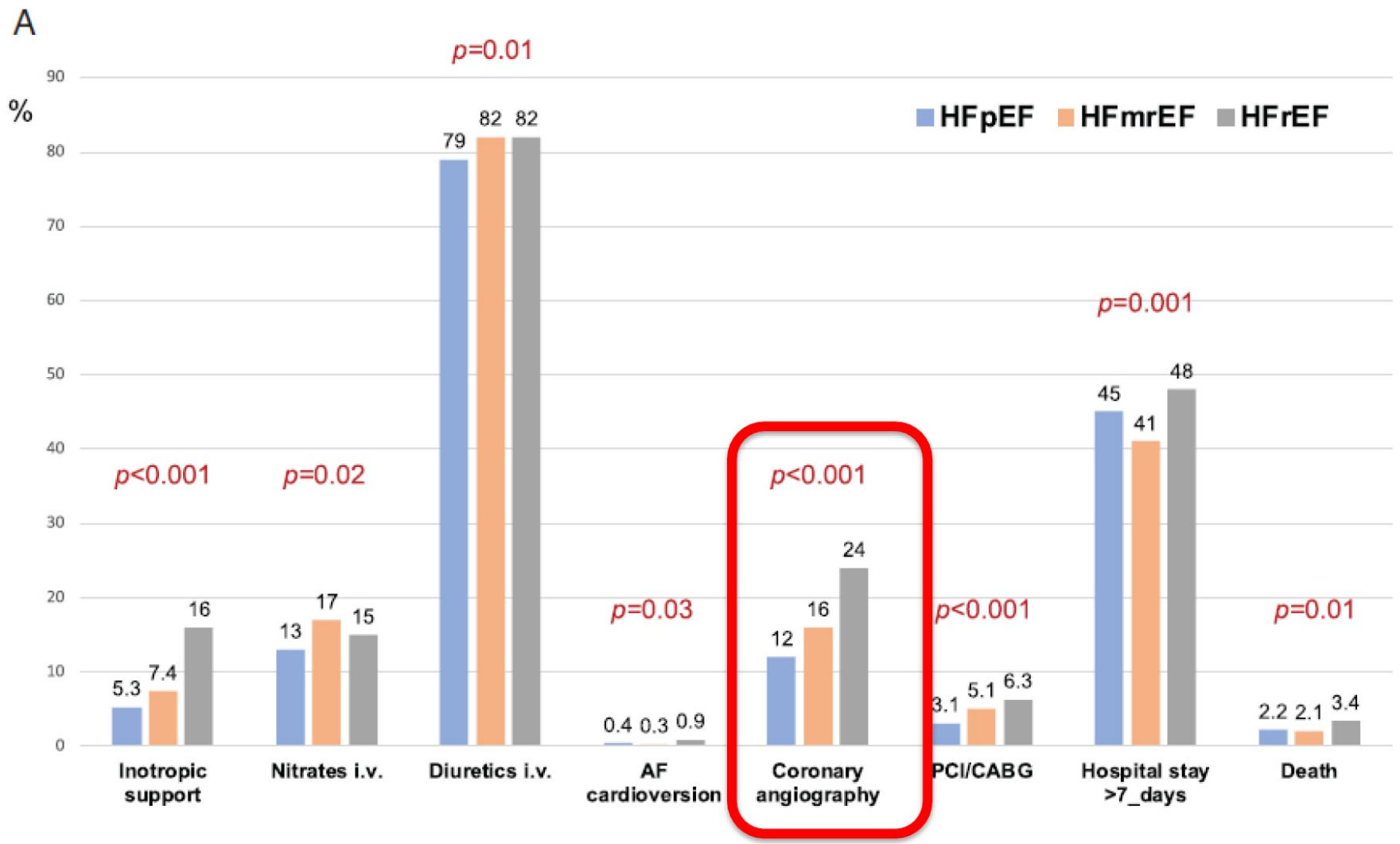
- **HFrEF vs HFpEF: 2x likely to be referred to angiography (21% vs. 9%)**
- **61% angiography during the ADHF hospitalization (66% HFrEF vs 49% HFpEF)**
- **11%AMI as admission diagnosis (14% HFrEF vs. 5% HFpEF)**
- **24% In-hospital coronary revascularization HFrEF (25%) HFpEF (22%)**
- **Obstructive CAD HFrEF vs HFpEF (67% vs. 54%)**
- **Patients with HFrEF and obstructive CAD vs HFrEF and non obstructive CAD were:**
  - **older (73 vs. 69 years)**
  - **less often women (39% vs. 47%) or Black (23% vs. 47%)**

European Journal of Heart Failure (2022) **24**, 2140–2149

ESC-HFA EORP Heart Failure Long-Term Registry



60% of HFpEF have CAD

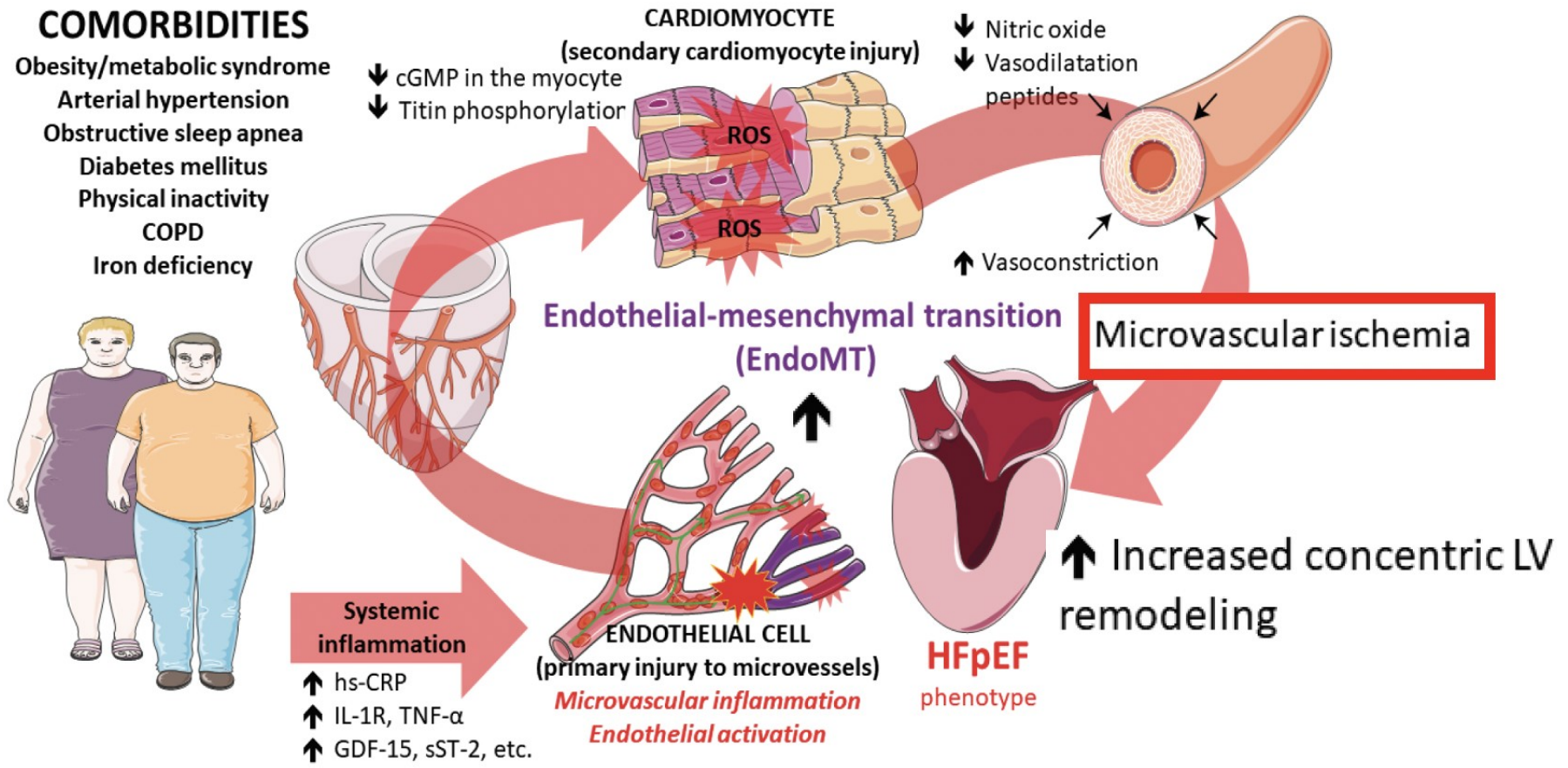


Heart Failure & World Congress on Acute Heart Failure 2024

N Engl J Med. 2007;355:260–269

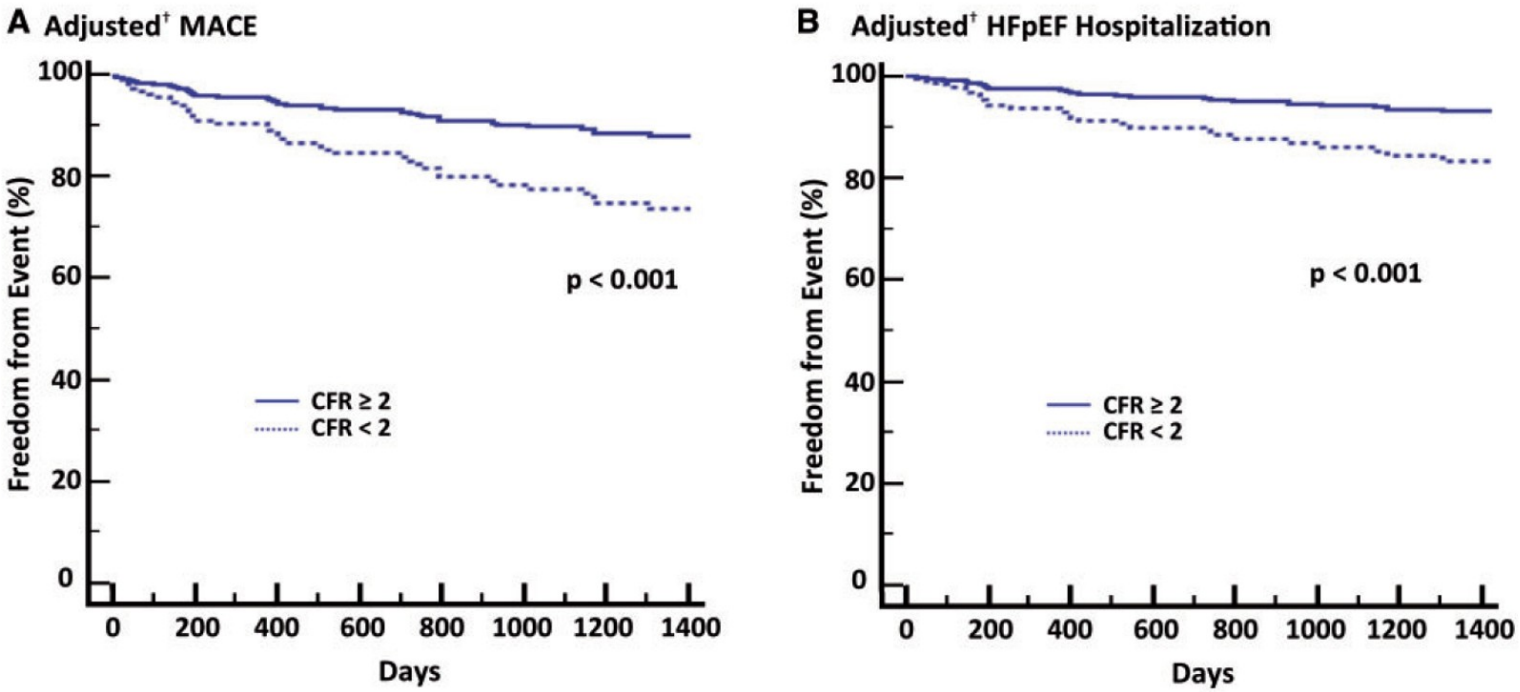
European Journal of Heart Failure (2022) **24**, 335–350

DISFUNÇÃO MICROVASCULAR CORONÁRIA E ICFEp



D'Amario et al, Frontiers in Physiol 2019)

DISFUNÇÃO MICROVASCULAR CORONÁRIA E ICFEp



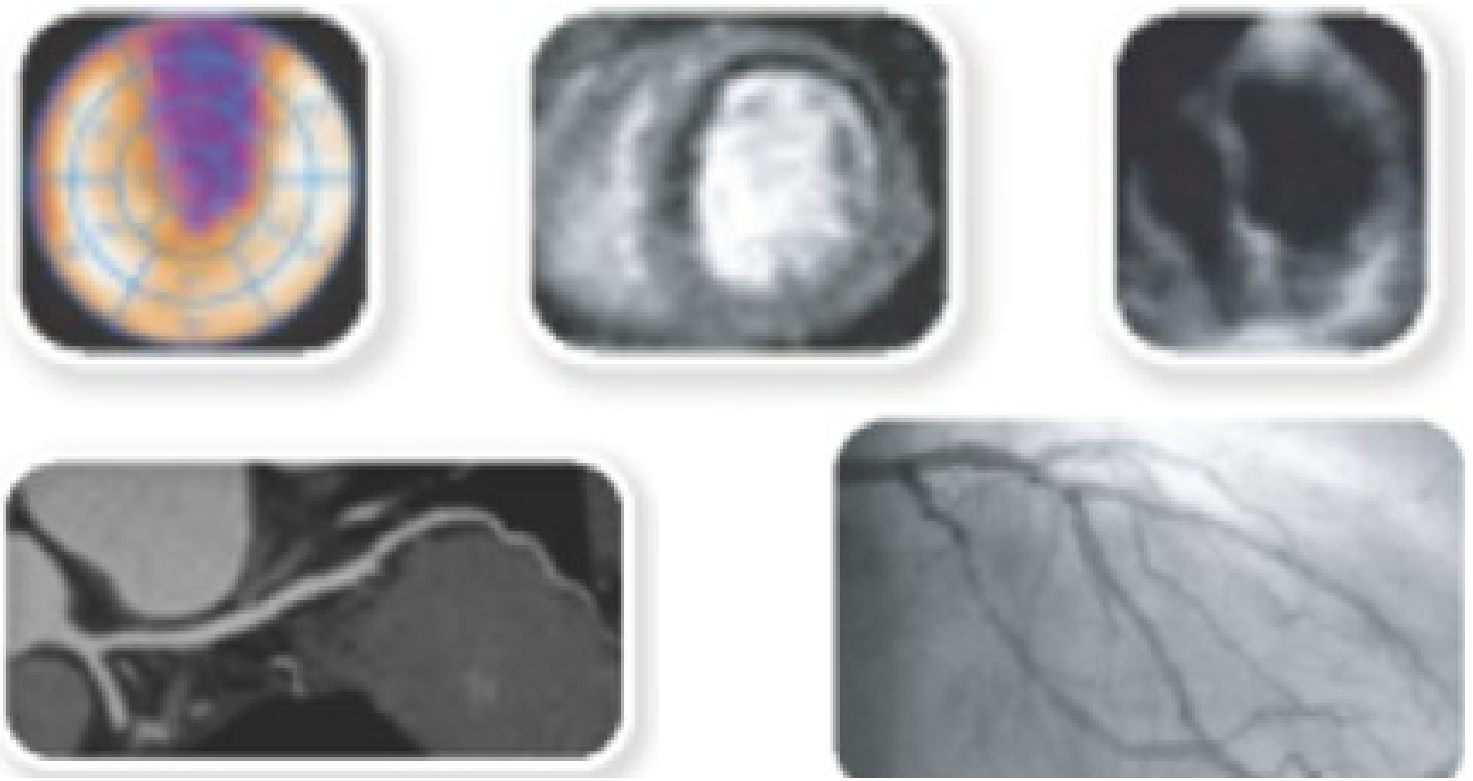
*Cardiovascular death or hospitalization for myocardial infarction or heart failure.

†Adjusted for pretest clinical score, history of atrial fibrillation, estimated glomerular filtration rate <60 ml•min^{-1}•1.73m^{-2}, detectable troponin, left ventricular ejection fraction and E/e'$_{septal}$ >15.

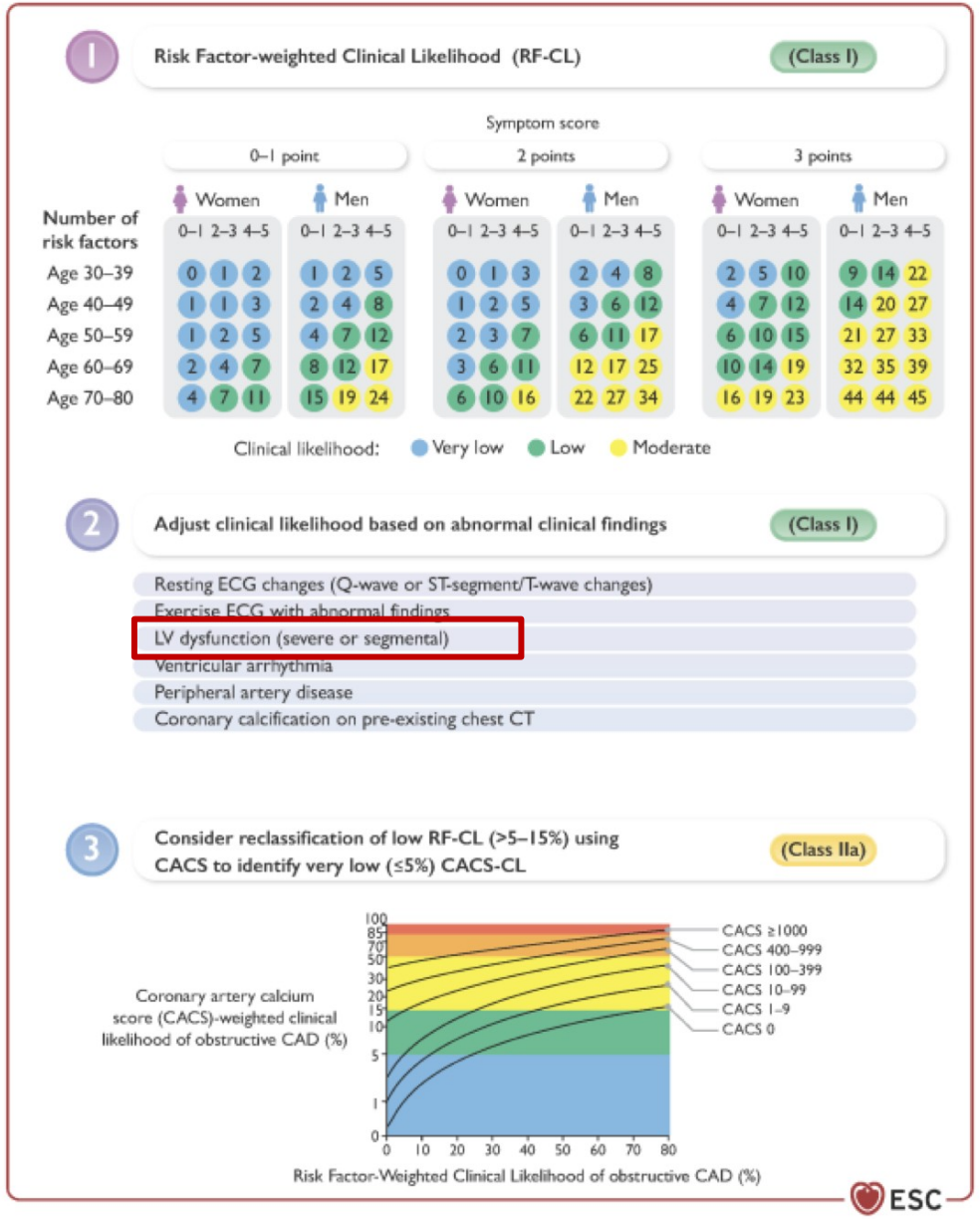
Taqueti et al, EHJ 2018

DIAGNÓSTICO

Seleção adequada de exames

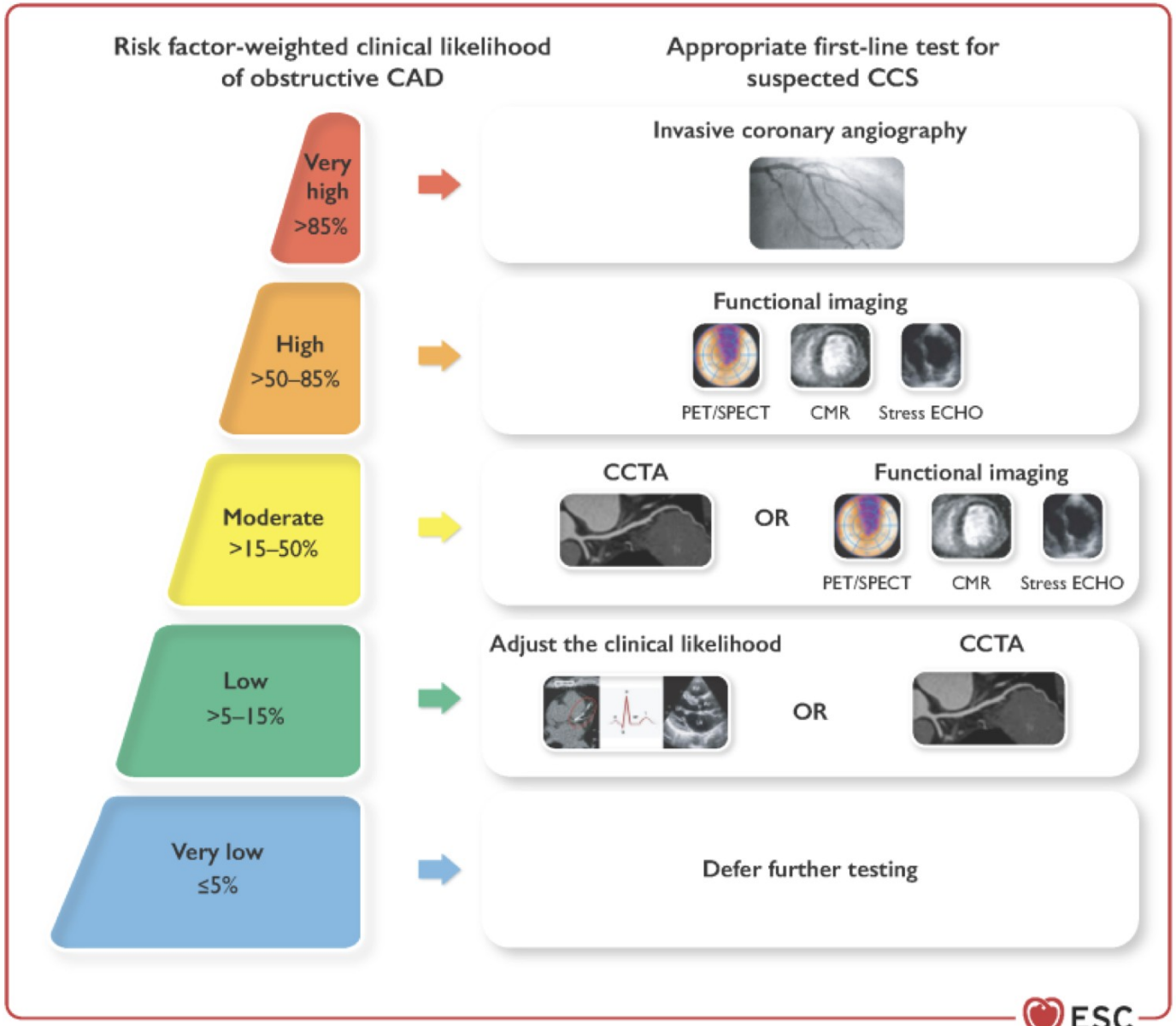


Adjustment and reclassification of the estimated clinical likelihood of obstructive CAD



2024 ESC Guidelines for the management of chronic coronary syndromes (European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

Appropriate first-line testing in symptomatic patients with suspected CCS



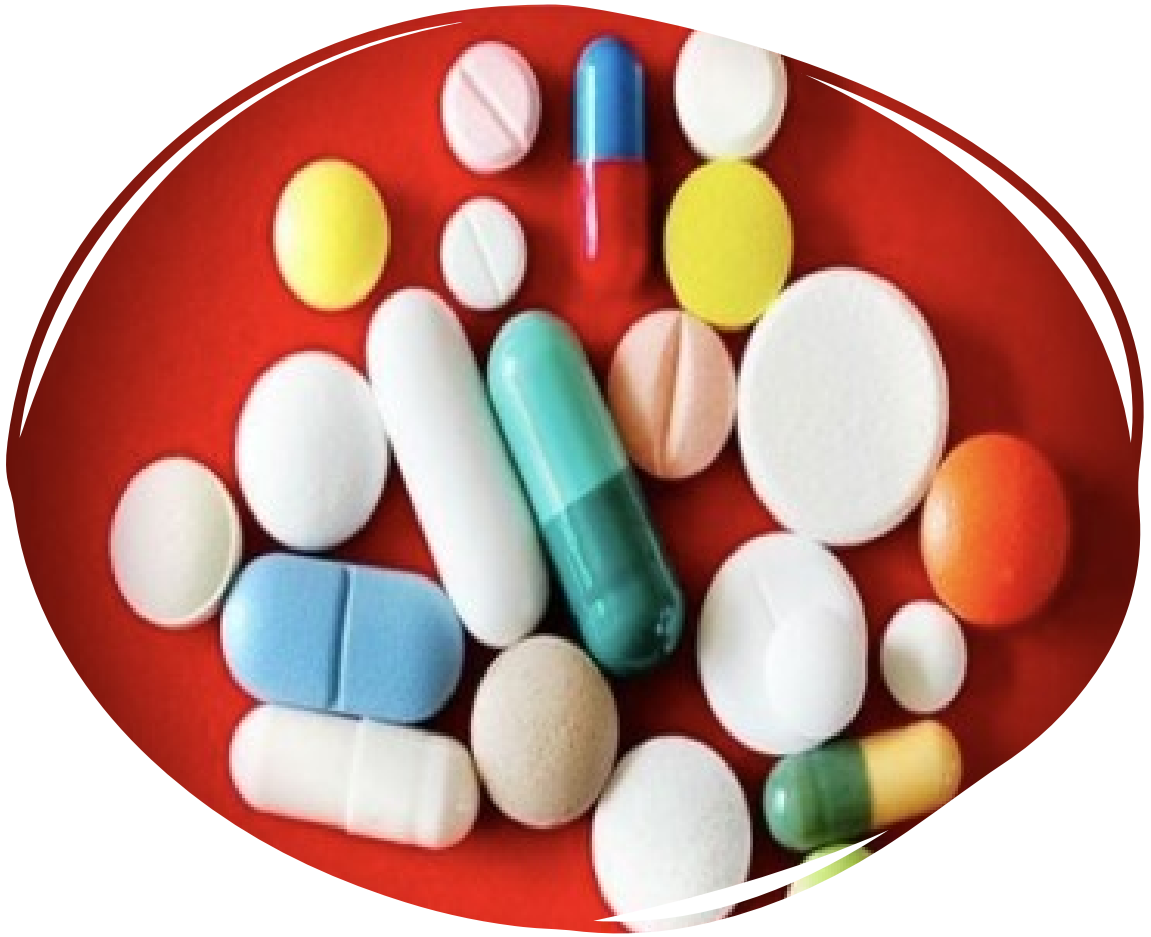
IC, FEVE <35%
Suspeita CAD
Classe I

2024 ESC Guidelines for the management of chronic coronary syndromes
(European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

Recommendations for management of chronic coronary syndrome patients with chronic heart failure (1)

Recommendations	Class	Level
Managing CCS in heart failure patients		
In HF patients with LVEF ≤35% in whom obstructive CAD is suspected, ICA is recommended with a view towards improving prognosis by CABG, taking into account the risk-to-benefit ratio of the procedures.	I	B
In HF patients with LVEF >35% and suspected CCS with low or moderate (>5%–50%) pre-test likelihood of obstructive CAD, CCTA or functional imaging is recommended.	I	C
In HF patients with LVEF >35% and suspected CCS with very high (>85%) pre-test likelihood of obstructive CAD, ICA (with FFR, iFR, or QFR when needed) is recommended.	I	C
In patients with HFpEF with persistent angina or equivalent symptoms and normal or non-obstructive epicardial coronary arteries, PET or CMR perfusion or invasive coronary functional testing should be considered to detect or rule out coronary microvascular dysfunction.	IIa	B
In selected patients with HFrEF undergoing high-risk PCI for complex CAD, the use of a microaxial flow pump may be considered in experienced centres.	IIb	C

2024 ESC Guidelines for the management of chronic coronary syndromes
(European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

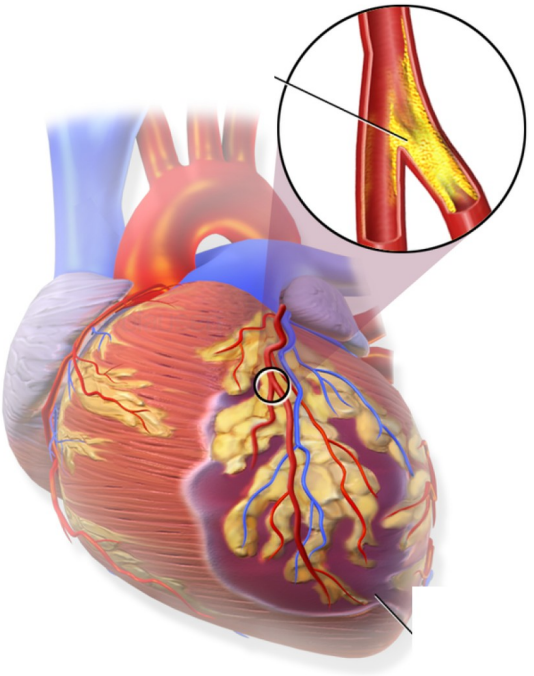


TERAPÊUTICA MÉDICA

PREVENÇÃO SECUNDÁRIA NAS SCC

- **Redução do risco residual aterosclerótico**
  - Terapêutica antitrombótica
  - Redução de lípidos
  - Otimização do metabolismo
  - Controlo da inflamação

- **Redução do risco de Insuficiência Cardíaca**
  - IECA/ARA II
  - Beta-Bloqueantes
  - Antagonistas dos recetores mineralocorticóides
  - ARNI
  - iSGLT2



Recommendations for management of chronic coronary syndrome patients with chronic heart failure (2)

Recommendations	Class	Level
Managing heart failure in CCS patients		
It is recommended that CCS patients with HF be enrolled in a multidisciplinary HF management programme to reduce the risk of HF hospitalization and to improve survival.	I	A
An ACE-I, an MRA, an SGLT2 inhibitor (dapagliflozin or empagliflozin), and, in stable conditions, a beta-blocker are recommended for CCS patients with HFrEF to reduce the risk of HF hospitalization and death.	I	A
An SGLT2 inhibitor (dapagliflozin or empagliflozin) is recommended in patients with Heart Failure with mildly reduced Ejection Fraction (HFmrEF) or HFpEF to reduce the risk of HF hospitalization or cardiovascular death.	I	A
An ARB is recommended in symptomatic patients with CCS and HFrEF unable to tolerate an ACE-I or ARNI to reduce the risk of HF hospitalization and cardiovascular death.	I	B
Sacubitril/valsartan is recommended as a replacement for an ACE-I or ARB in CCS patients with HFrEF to reduce the risk of HF hospitalization and of cardiovascular and all-cause death.	I	B
Diuretics are recommended in CCS patients with HF and signs and/or symptoms of congestion to alleviate symptoms, improve exercise capacity, and reduce HF hospitalizations.	I	B

2024 ESC Guidelines for the management of chronic coronary syndromes
(European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

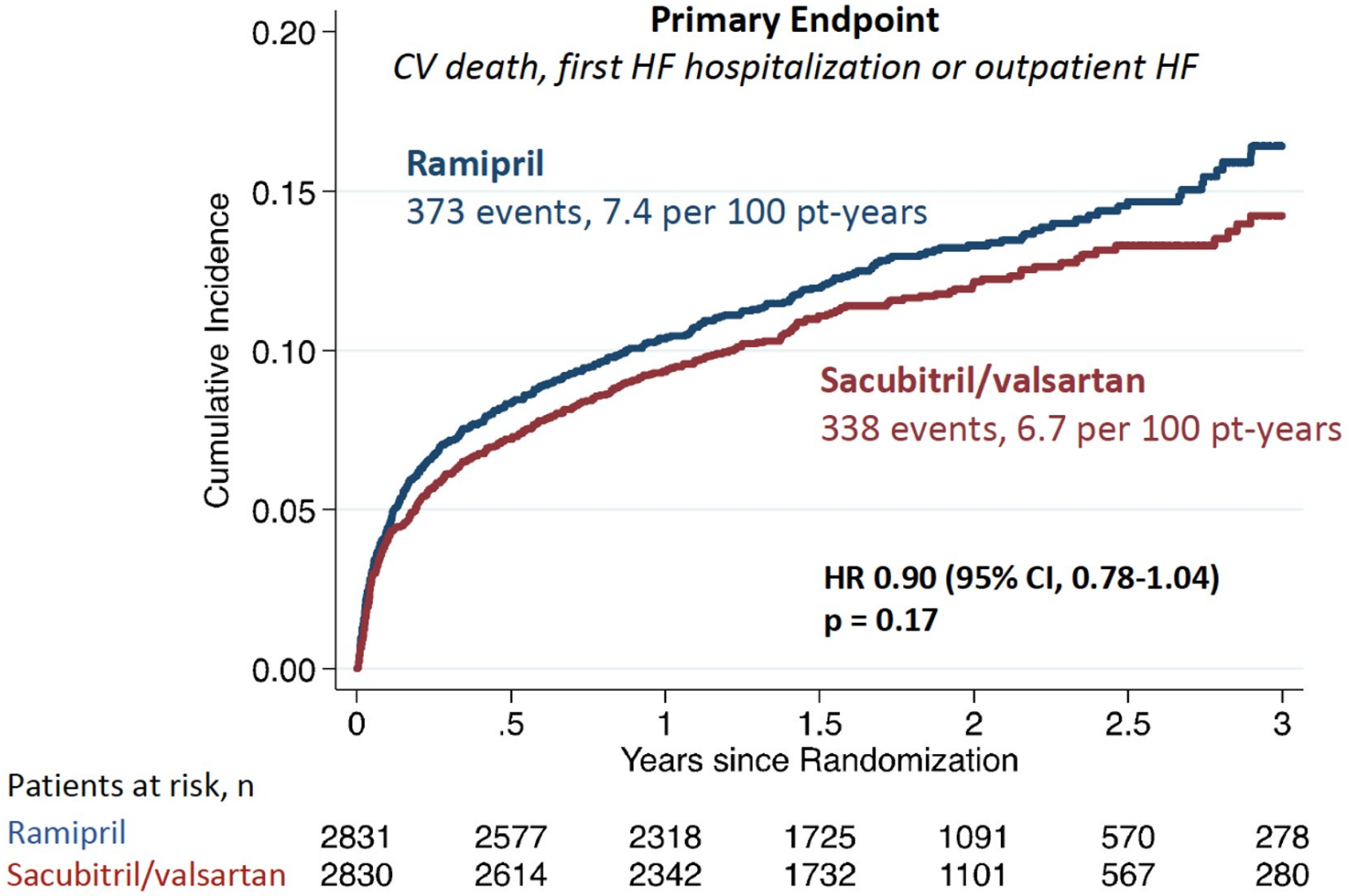
PREVENÇÃO DA IC NO PÓS-EAM

Quando iniciar?

ARNI
iSGLT2

PARADISE-MI Trial

n=5 661
FEVE <40% c/ ou s/
Congestão pulmonar

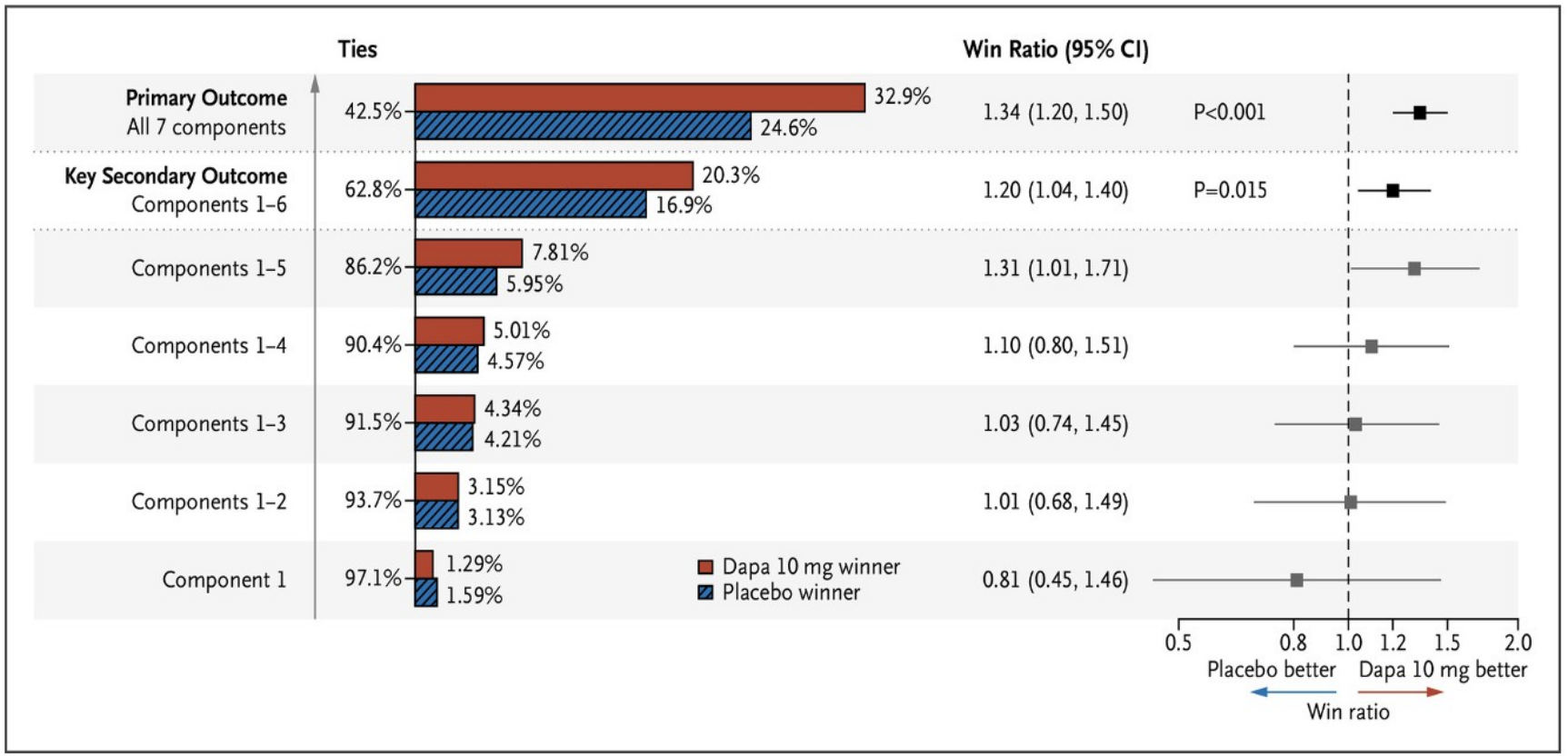


Pfeffer M et al. N Engl J Med. 2021;385:1845-1855

DAPA-MI

1. Death,
2. Hospitalization for heart failure,
3. Nonfatal MI,
4. Atrial fibrillation/flutter,
5. New diagnosis of type 2 diabetes,
6. NYHA class, and
7. Weight decrease of 5% or more.

N= 4 017
FEVEr
EAM onda Q

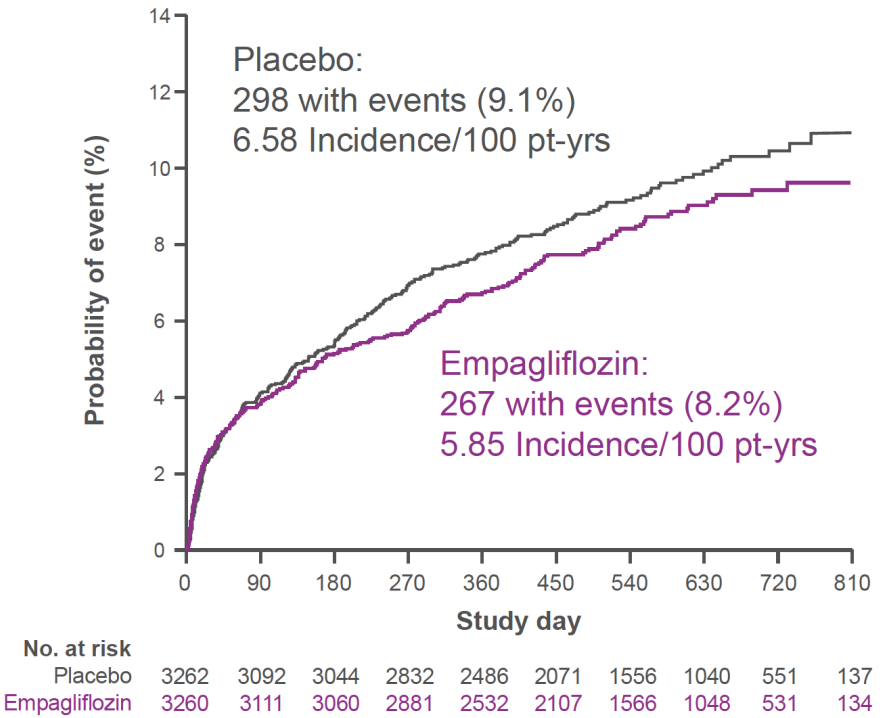


James S, Erlinge D, Storey RF, et al. *NEJM Evid.* 2024;3(2):EVIDoa2300286. doi:10.1056/EVIDoa2300286

EMPACT-MI

n= 3 260
FEVE <45% e/ou
Congestão pulmonar

Primary Endpoint



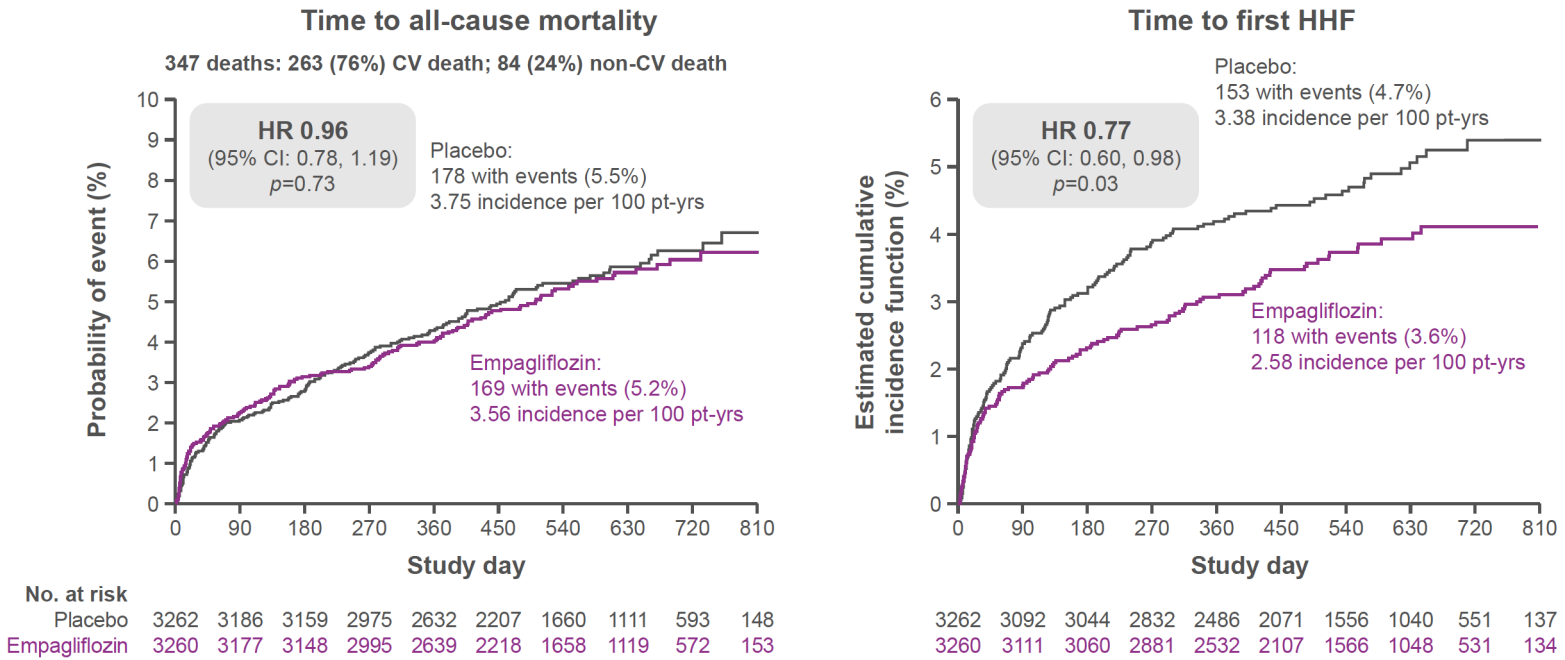
HR 0.90 (95% CI: 0.76, 1.06)
p=0.21

565 primary endpoint events
- **271 (48%) first events: HHF**
- **294 (52%) first events: death**

Butler J, et al. **N Engl J Med 2024;390:1455-1466**

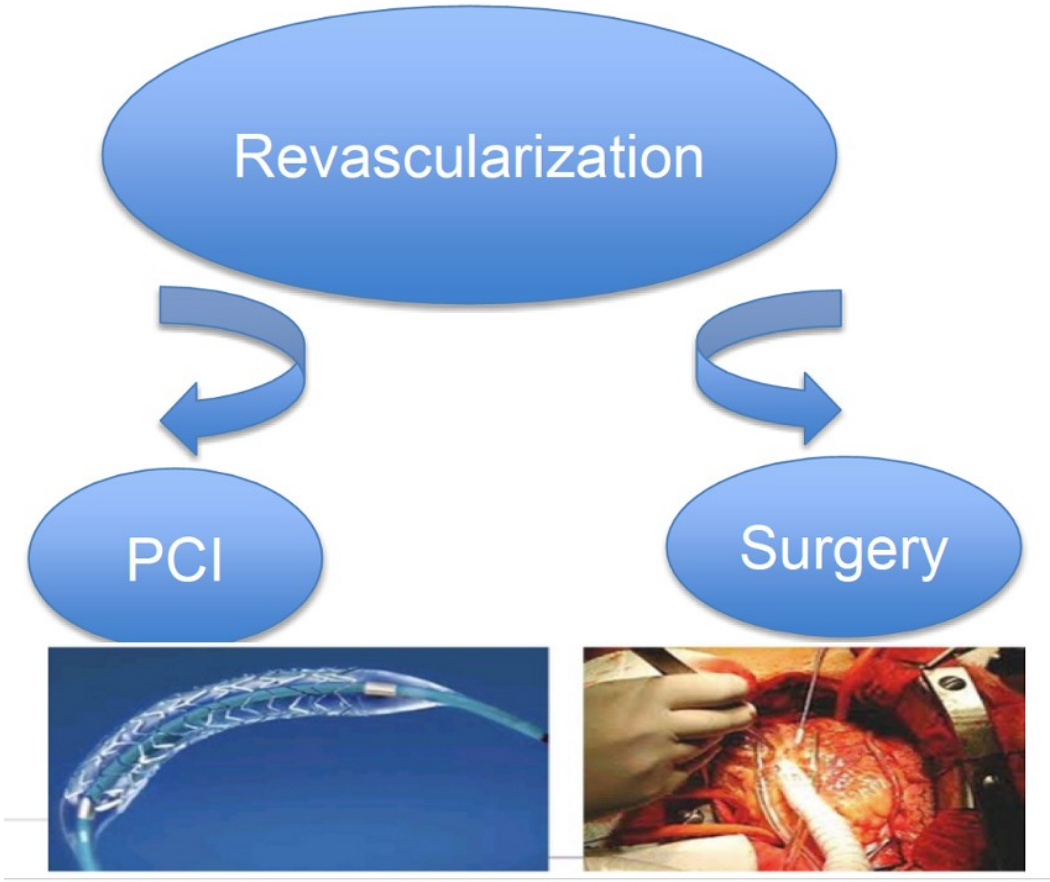
EMPACT-MI

Components of primary endpoint



Butler J, et al. **N Engl J Med 2024;390:1455-146**

REVASCULARIZAÇÃO



BENEFÍCIO DA CABG

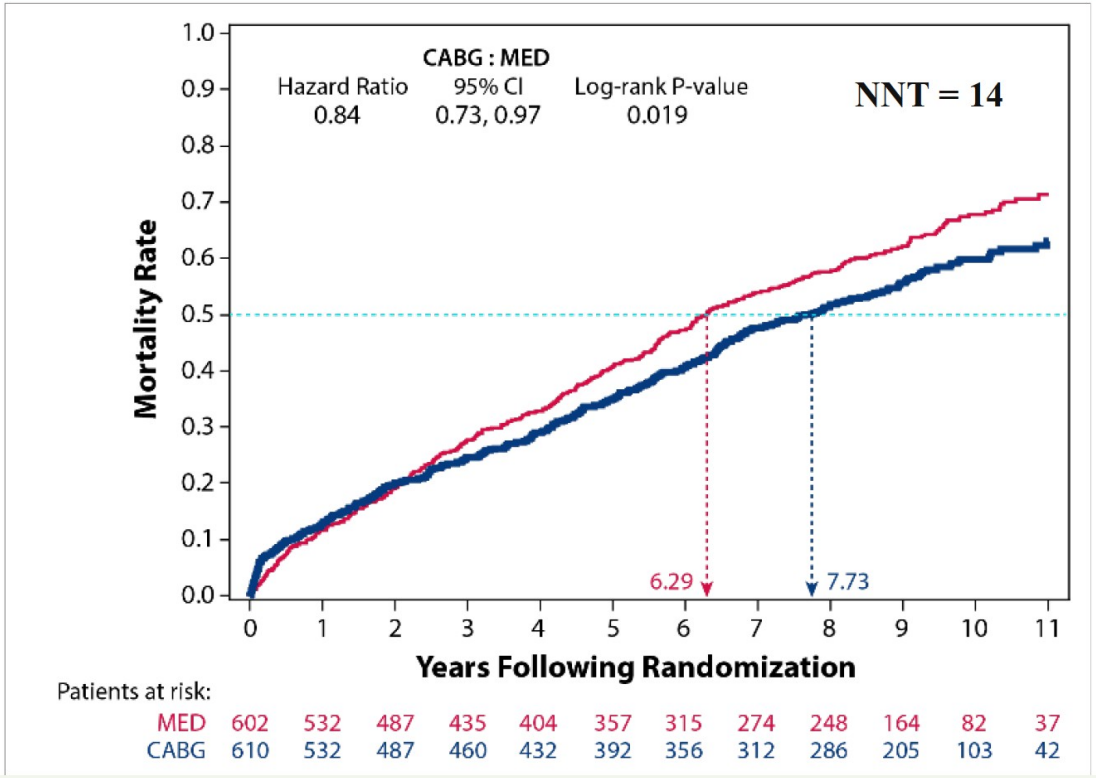
- 1212 patients (36% with no angina), LVEF≤35%, extensive CAD
- CABG vs optimal medical therapy (OMT)
- 10-years FUP

↓

➢ CABG improved clinical outcomes only at late follow-up:

All cause mortality, CV death and composite of death + HF hospitalizations

STICH – all cause mortality



Velazquez EJ, et al. N Engl J Med 2016:374:1511-20

BENEFÍCIO DA PCI

- 700 patients (67% with no angina)
  - Largely asymptomatic and stable (70% class I/II)
  - LVEF≤35% with extensive CAD
  - Viability in ≥4 dysfunctional myocardial segments
- PCI vs OMT
- 41 months median FUP

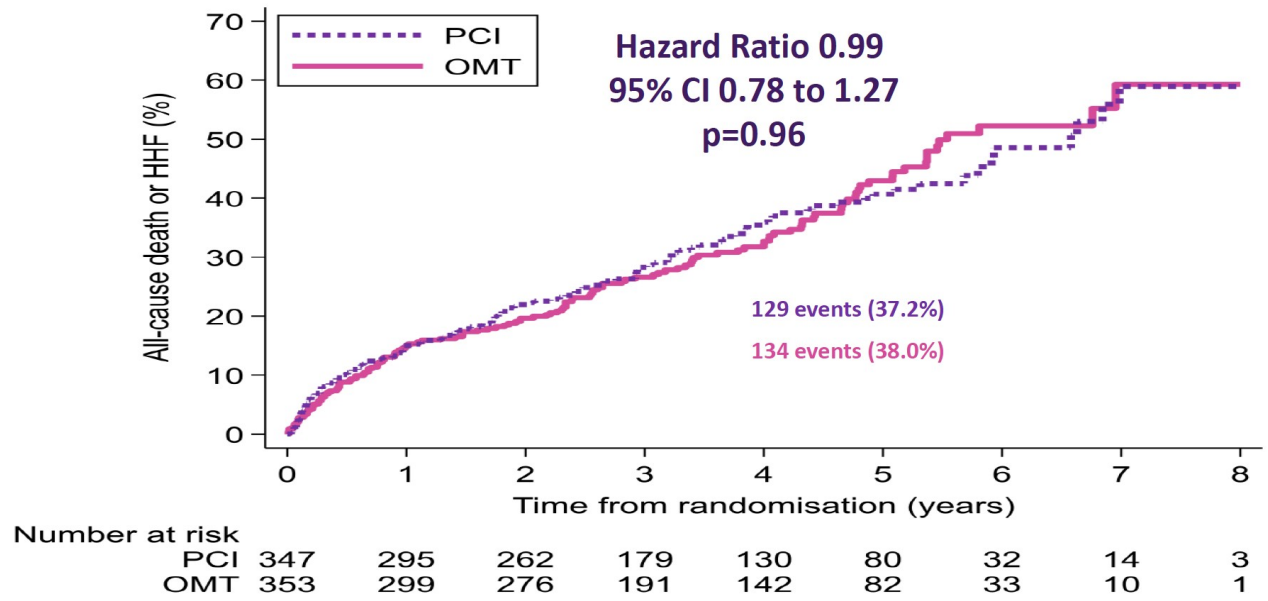
➢ PCI failed to improve clinical outcomes:

all cause mortality + HF hospitalizations, LVEF and symptoms

REVIVED

Primary Outcome

All cause death and HF hospitalisations

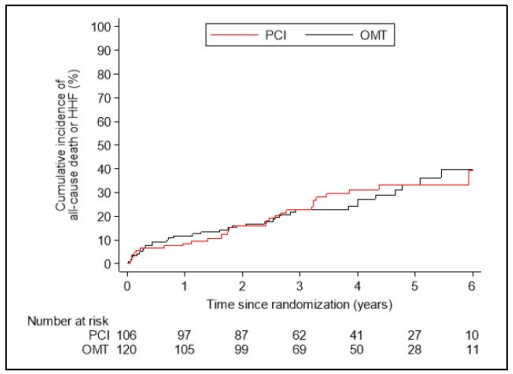


Perera D et al. JACC HF 2018

BENEFÍCIO DA PCI

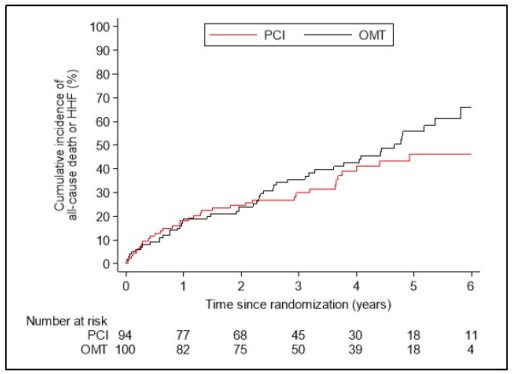
Primary outcome by myocardial viability

Low abundance of dysfunctional-viable segments
(<18 % LV)



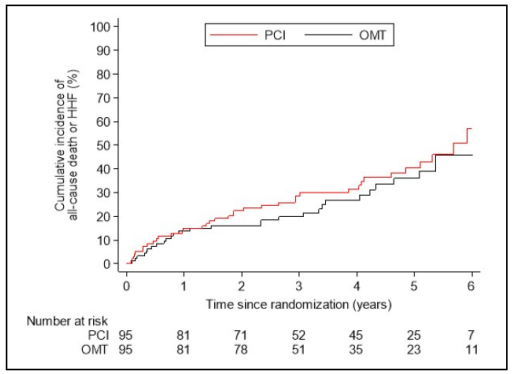
Adjusted hazard ratio 0.98 (0.61 to 1.59)

Medium abundance of dysfunctional-viable segments
(18 to 41 % LV)



Adjusted hazard ratio 0.83 (0.54 to 1.28)

High abundance of dysfunctional-viable segments
(>41% LV)



Adjusted hazard ratio 1.28 (0.79 to 2.10)

p for interaction = 0.43

Perera D et al. JACC HF 2018

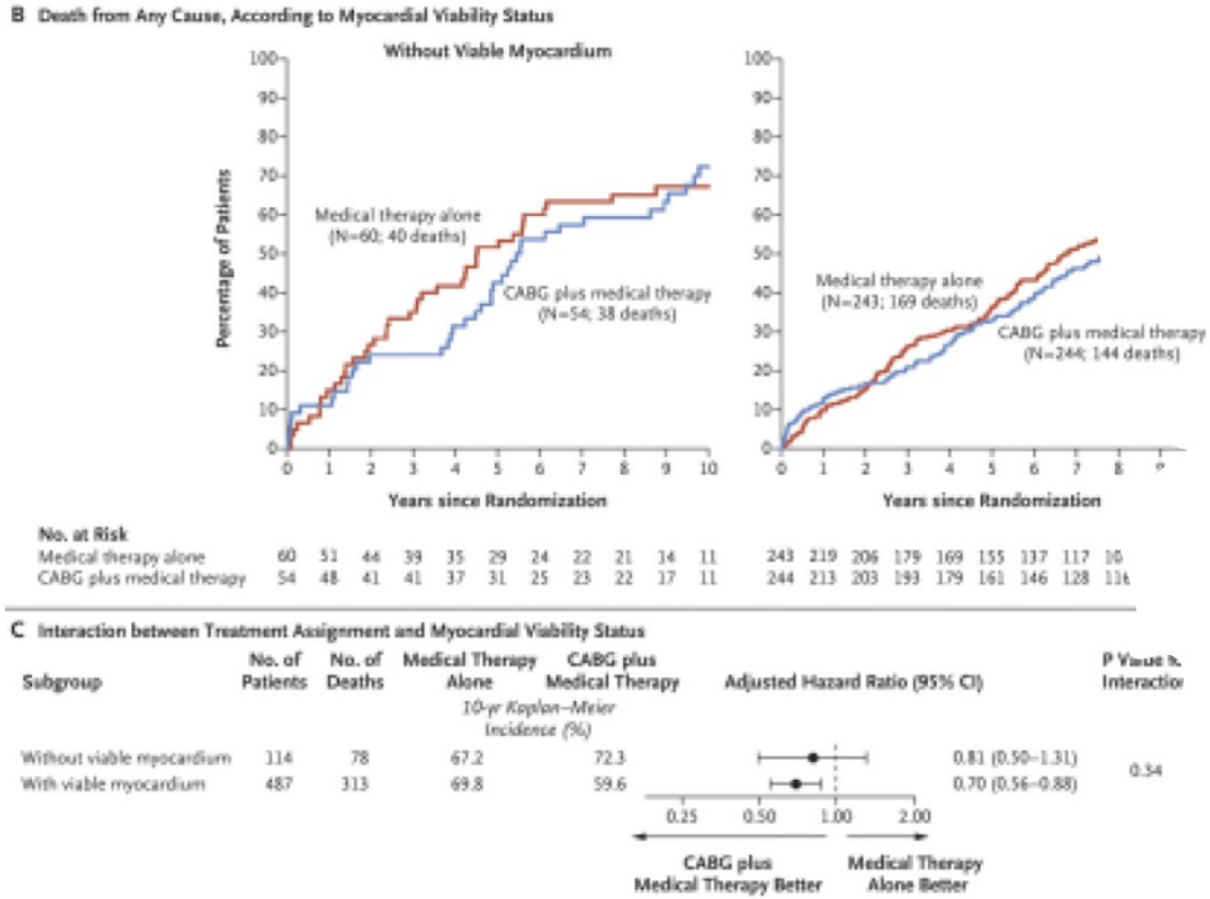
VIABILIDADE MIOCÁRDICA

STICH Trial: Viability sub-analysis 10 years FUP

- Study endpoints analysed according to myocardial viability (SPECT or Dobu)

↓

- Viability did not identify outcome benefit of CABG vs OMT
- An increase in LVEF in patients with myocardial viability was <u>not</u> associated with survival benefit



Panza JA et al, N Engl J Med 2019;381:739-748

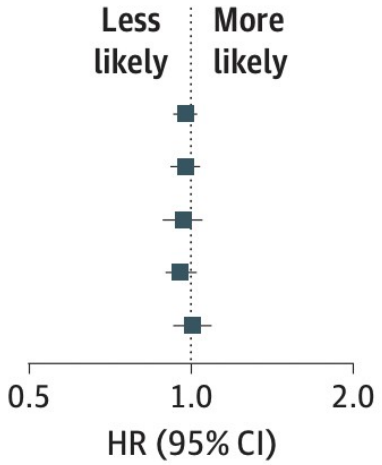
VIABILIDADE MIOCÁRDICA

REVIVED
REVASCULARISATION FOR ISCHAEMIC VENTRICULAR DYSFUNCTION

Figure 3. Association Between Viability Characteristics and Trial Outcomes

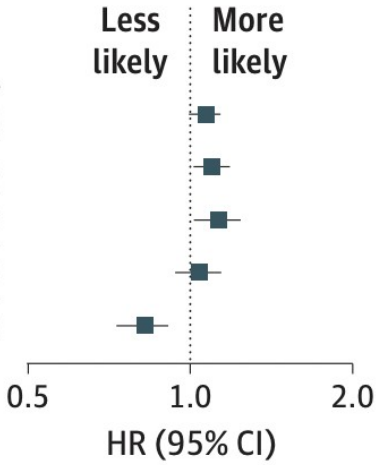
A Viable myocardium

Outcomes	HR (95% CI)
Primary outcome	0.98 (0.93-1.04)
All-cause death	0.98 (0.92-1.04)
Cardiovascular death	0.97 (0.91-1.04)
Hospitalization for heart failure	0.96 (0.88-1.05)
Improved left ventricular function	1.01 (0.93-1.11)



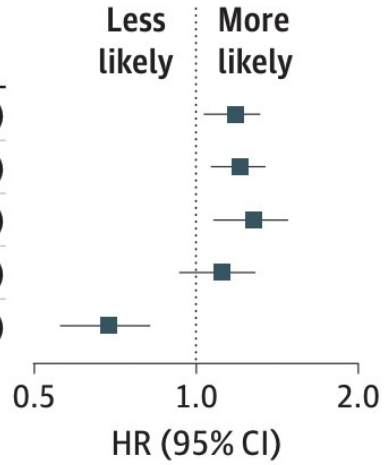
B Nonviable myocardium

HR (95% CI)
1.07 (1.00-1.15)
1.10 (1.02-1.18)
1.13 (1.03-1.23)
1.04 (0.93-1.17)
0.82 (0.73-0.93)

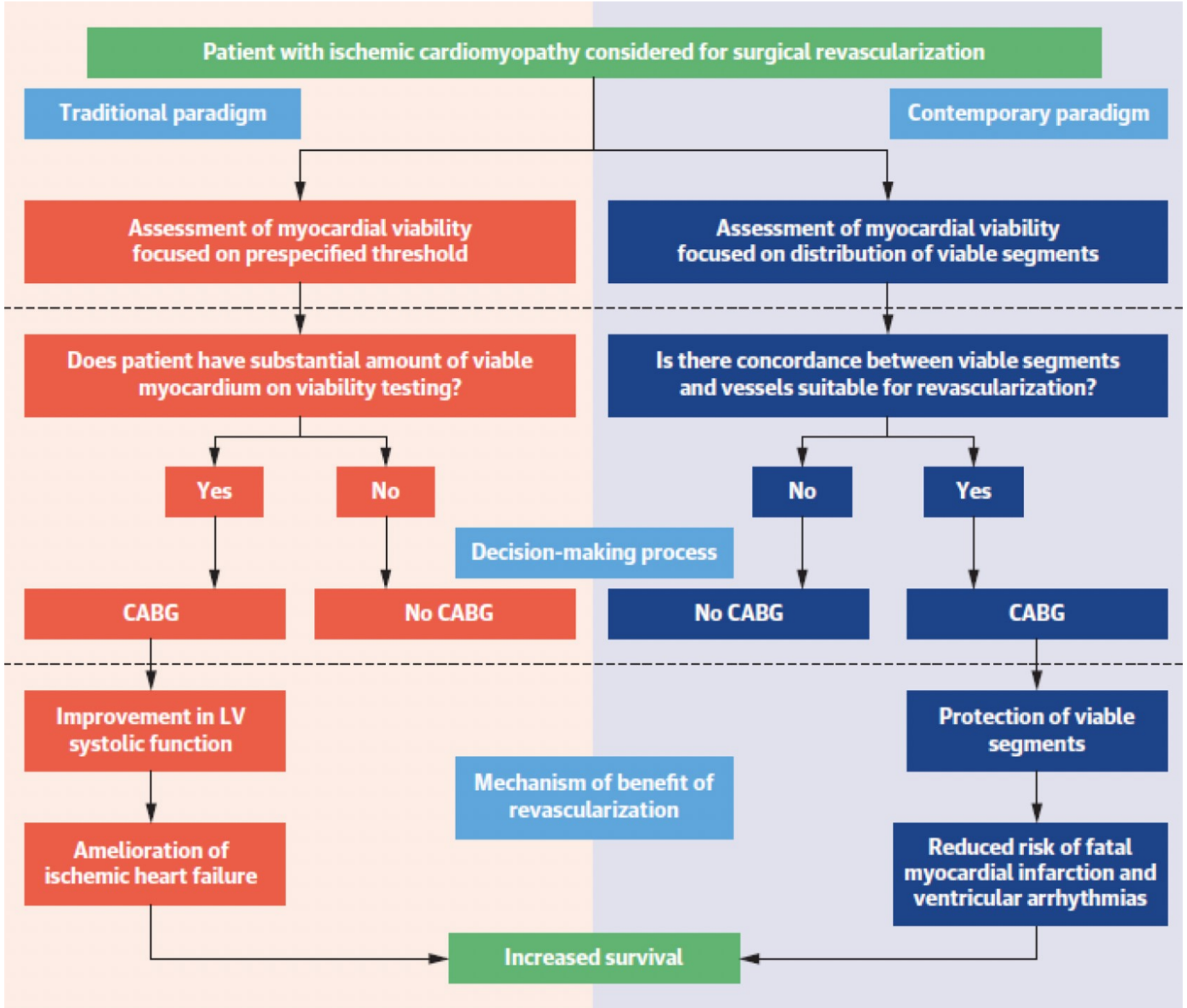


C Scar

HR (95% CI)
1.18 (1.04-1.33)
1.21 (1.07-1.38)
1.28 (1.10-1.49)
1.11 (0.91-1.36)
0.69 (0.56-0.84)



Perera D, et al. JAMA Cardiol. 2023;8(12):1154-1161. doi:10.1001/jamacardio.2023.3803



Panza, J.A. et al. J Am Coll Cardiol. 2021;78(10):1068-1077.

Recommendations for revascularization in patients with chronic coronary syndrome (3)

Recommendations	Class	Level
Revascularization to improve outcomes cont.		
In CCS patients with LVEF ≤35%, it is recommended to choose between revascularization or medical therapy alone, after careful evaluation, preferably by the Heart Team, of coronary anatomy, correlation between coronary artery disease and LV dysfunction, comorbidities, life expectancy, individual risk-to-benefit ratio, and patient perspectives.	I	C
In surgically eligible CCS patients with multivessel CAD and LVEF ≤35%, myocardial revascularization with CABG is recommended over medical therapy alone to improve long-term survival.	I	B
In selected CCS patients with functionally significant MVD and LVEF ≤35% who are at high surgical risk or not operable, PCI may be considered as an alternative to CABG.	IIb	B

CONCLUSÃO

- A doença cardíaca isquémica é a causa mais comum de IC
- A disfunção microvascular coronária está associada ao desenvolvimento de ICFEp
- O controlo rigoroso dos fatores de risco e atingimento precoce dos alvos terapêuticos é essencial para reduzir o risco residual aterosclerótico
- A administração precoce de antagonistas neurohormonais é crítica para reduzir o risco de morte e IC
- A revascularização cirúrgica tem potencial de melhorar a sobrevida a longo prazo
- A angioplastia coronária não melhora o prognóstico em doentes estáveis e deve ser reservada para o tratamento da angina ou SCA
- A abordagem de doentes com SCC e disfunção severa do VE deve ser individualizada e integrada, baseada em decisões tomadas em Heart Team