UT Southwestern Medical Center

Outpatient Heart Failure Management in 2025

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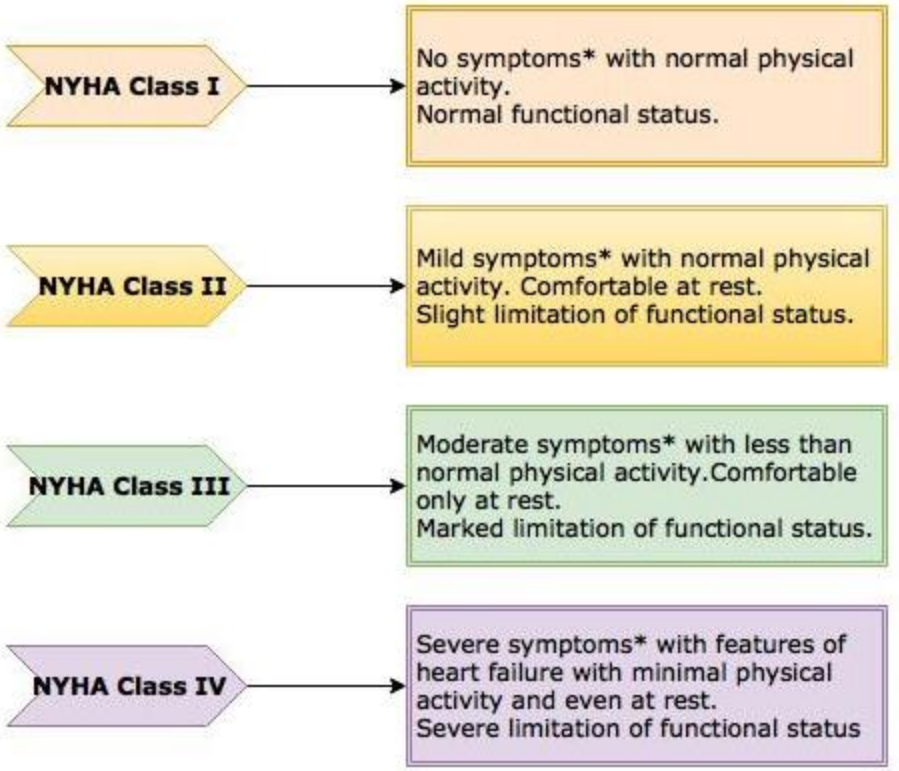
Pre-Questions

Heart Failure Management Outline

- Epidemiology in Sub-Saharan Africa
- Heart Failure Defined
- Heart failure with Preserved EF
- Heart failure with Reduced EF
- HF with mildly reduced and improved EF
- Post-questions

Some Terms

New York Heart Association (NYHA)



Symptoms - Fatigue, palpitations, chest pain, dyspnea, syncope

Heart failure is a Problem

- The burden of heart failure has been growi**ng in sub-Saharan African countries** over the past decades, including Zambia
- Non-communicable diseases were, as of 2015, ranked as the leading cause of mortality after the HIV and AIDS in sub-Saharan Africa
- Non-communicable diseases are predicted to **surpass** HIV/AIDS as the biggest killer in sub-Saharan Africa over the next decade (2015-2025)

V.N. Agbor et al. International Journal of Cardiology (2018)

Heart Failure is a Problem

- Heart failure continues to be a worldwide growing problem owing to an **increasing elderly population and comorbid conditions**
- Increasing prevalence of hypertension, diabetes mellitus, and obesity related to westernization and urbanization.
- Globally, **ischemic heart disease** is the most common cause of heart failure (27%) followed by hypertensive heart disease (26%).

Heart Failure Defined

Symptoms and/or signs of heart failure (HF) caused by structural/functional cardiac abnormalities **and at least 1** of:

1. Elevated natriuretic peptides; or

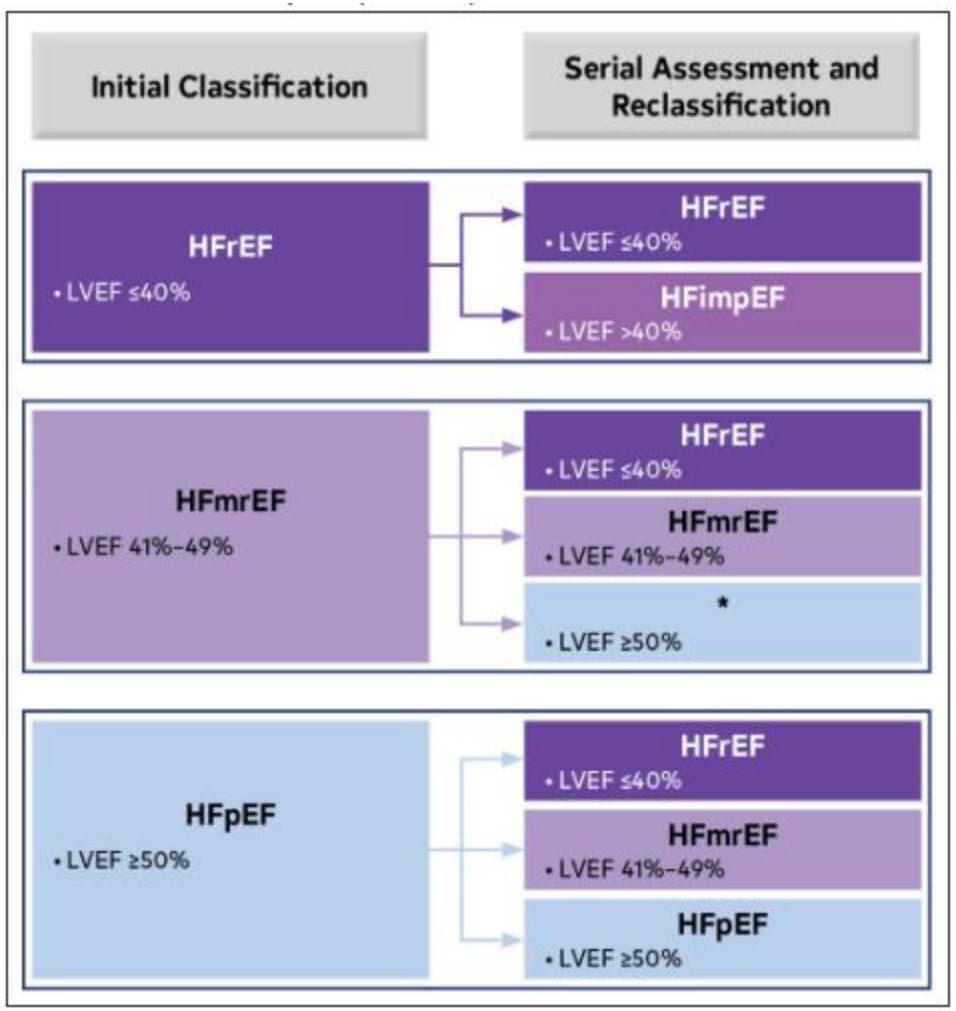
2. Objective evidence of cardiogenic pulmonary or systemic congestion

NP levels supporting diagnosis of HF	
	Rule-out Threshold
BNP, pg/mL	≥35
NT-proBNP, pg/mL	≥125

Heart Failure Defined

Classification of heart failure (HF) by LVEF:

- **HFrEF:** LVEF ≤ 40%
- **HFmrEF:** LVEF 41 to 49% and evidence of spontaneous or provokable increased LV filling pressures.
- **HFpEF:** LVEF ≥ 50% and evidence of spontaneous or provokable increased LV filling pressures.
- **HFimpEF:** Previous LVEF ≤40% and a follow up measurement of LVEF > 40%



*** There is limited evidence to guide treatment for patients who improve their LVEF from mildly reduced to ≥50%**

Heart Failure with Preserved Ejection Fraction

H_2FpEF is a diagnostic scoring system which was derived and validated using a gold-standard reference of invasive exercise hemodynamic measurements and is the more practical system for use by clinicians.

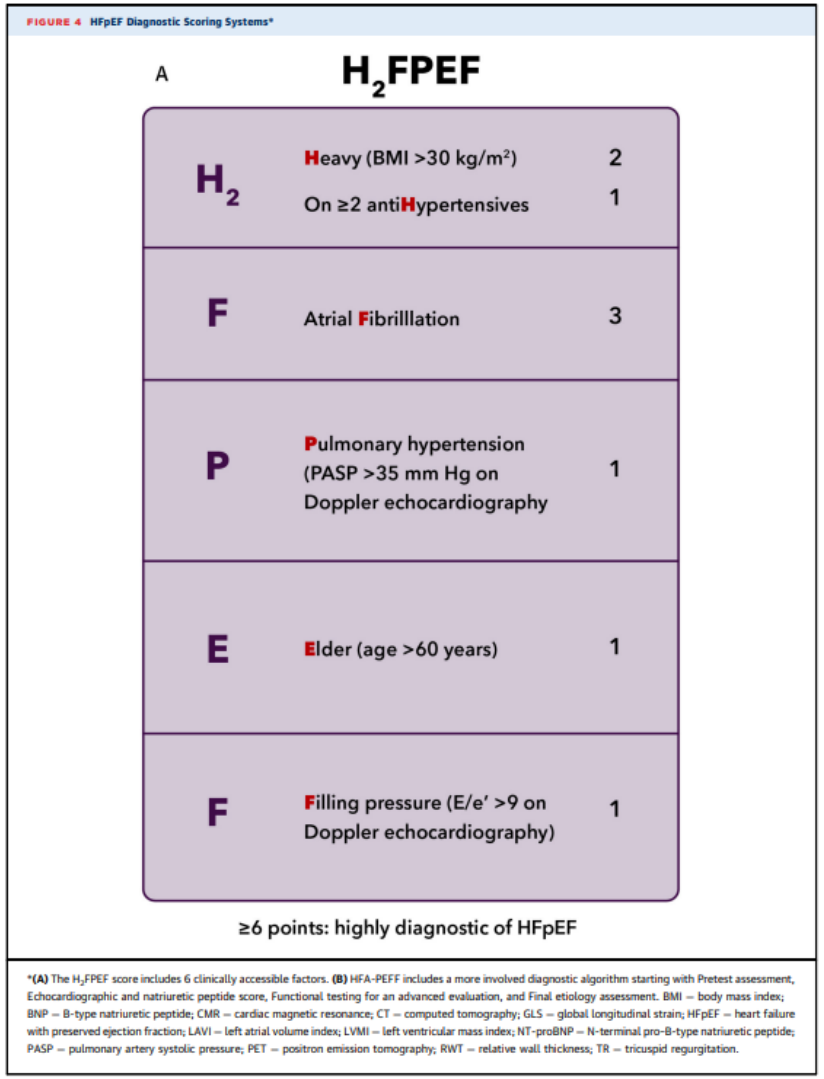


FIGURE 4 HFpEF Diagnostic Scoring Systems*

A

H_2FPEF

H_2	Heavy (BMI >30 kg/m²)	2
	On ≥2 antiHypertensives	1
F	Atrial Fibrilllation	3
P	Pulmonary hypertension (PASP >35 mm Hg on Doppler echocardiography	1
E	Elder (age >60 years)	1
F	Filling pressure (E/e' >9 on Doppler echocardiography)	1

≥6 points: highly diagnostic of HFpEF

*(A) The H_2FPEF score includes 6 clinically accessible factors. (B) HFA-PEFF includes a more involved diagnostic algorithm starting with Pretest assessment, Echocardiographic and natriuretic peptide score, Functional testing for an advanced evaluation, and Final etiology assessment. BMI — body mass index; BNP — B-type natriuretic peptide; CMR — cardiac magnetic resonance; CT — computed tomography; GLS — global longitudinal strain; HFpEF — heart failure with preserved ejection fraction; LAVI — left atrial volume index; LVMI — left ventricular mass index; NT-proBNP — N-terminal pro-B-type natriuretic peptide; PASP — pulmonary artery systolic pressure; PET — positron emission tomography; RWT — relative wall thickness; TR — tricuspid regurgitation.

HFpEF LVEF ≥50%

- Highly prevalent, generally accounting for **up to 50%** of all patients with HF and is associated with significant morbidly and mortality

- Heterogeneous problem, contributed to by comorbidities that include **hypertension, diabetes, obesity, CAD, CKD**, and specific causes such as ***cardiac amyloidosis***.

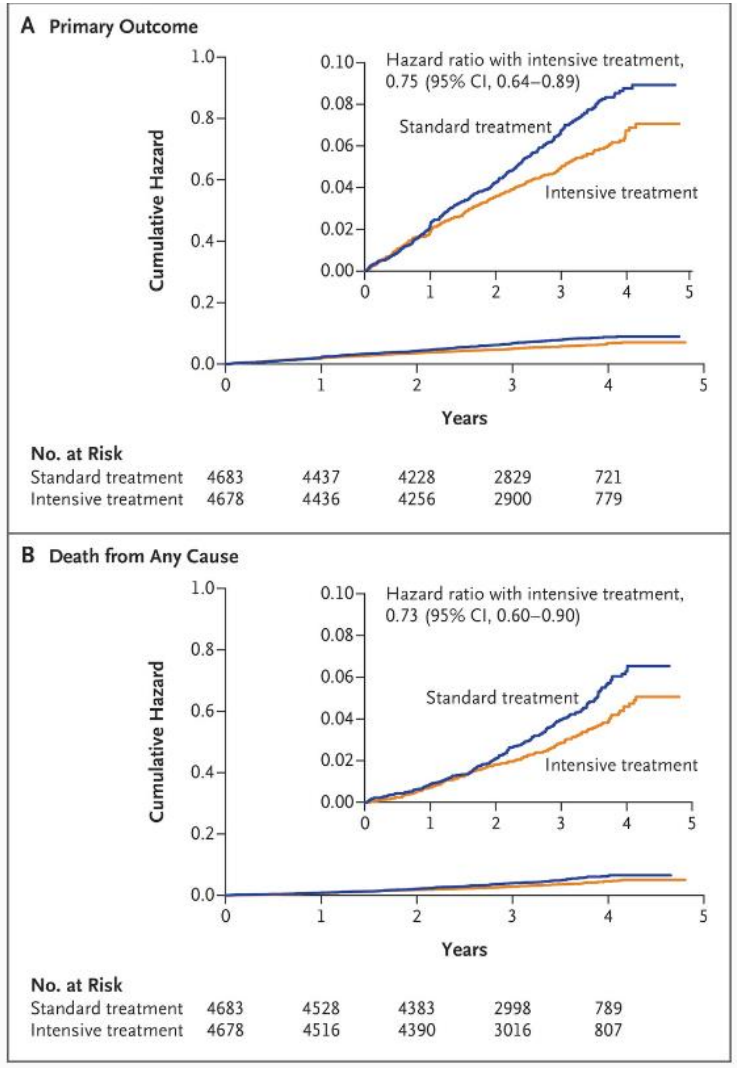
Currently, the recommended management is that used for HF in general with use of diuretics to reduce congestion and improve symptoms:

1. **Blood pressure control ***
2. **SGLT2i ***
3. **Management of atrial fibrillation**
4. **MRAs, ARBs, ARNi**

HFpEF management.

1. **BLOOD PRESSURE CONTROL** is well established for the prevention of all HF. The SPRINT trial (2015) established that MORE intensive blood pressure control in patients with high CV risk significantly reduced HF and other cardiovascular outcomes.

Target SBP in SPRINT was
< 120mmHg



Primary Outcome and Death from Any Cause.

Shown are the cumulative hazards for the primary outcome (a composite of myocardial infarction, acute coronary syndrome, stroke, heart failure, or death from cardiovascular causes) (Panel A) and for death from any cause (Panel B). The inset in each panel shows the same data on an enlarged y axis. CI denotes confidence interval.

HFpEF Management

1.BLOOD PRESSURE CONTROL

2.SGLT2i

HFpEF Management

Sodium Glucose CoTransporter-2 Inhibitors (SGLT2i) --

- **EMPEROR-Preserved** trial (2021) showed a significant benefit of the SGLT2i, empagliflozin, in symptomatic patients with HF with LVEF >40% and elevated natriuretic peptides

- **DELIVER** trial (2022) showed that regardless of diabetes status, among patients with LVEF > 40%, **addition of dapagliflozin reduced HF hospitalizations, urgent HF visits, or CVD mortality**

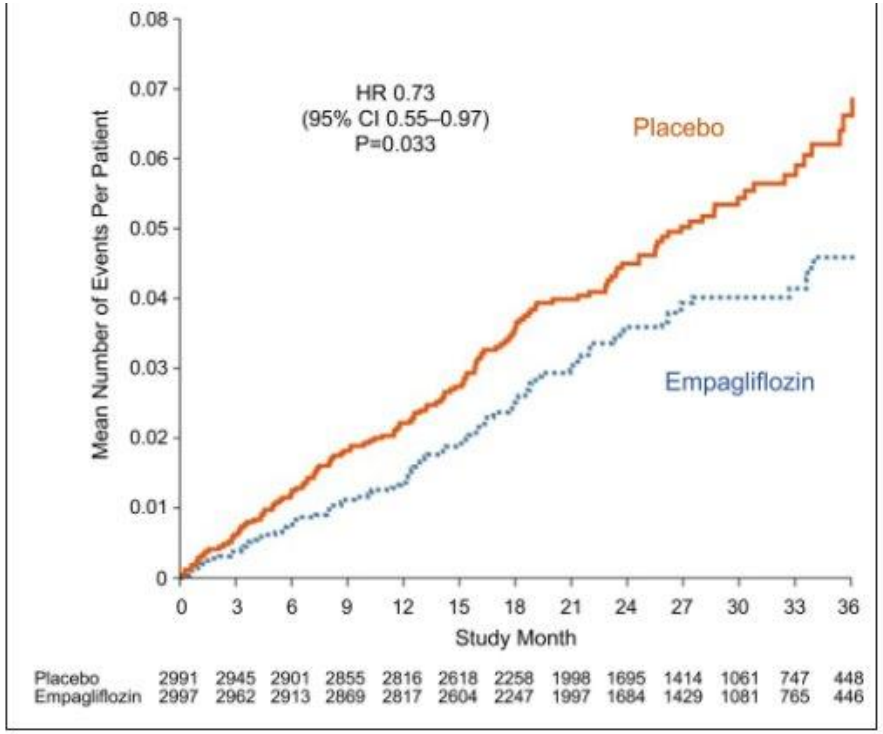


Figure 1. **Total (first and recurrent) hospitalizations for any reason that required intravenous vasopressors or positive inotropic agents.** Shown are mean cumulative function curves for placebo (shown in red) and for empagliflozin (shown in blue). HR indicates hazard ratio.

HFpEF Management – SGLT2i

SGLT2i -- EMPEROR-Preserved

- The **21% reduction** in the primary composite endpoint of time to HF hospitalization or cardiovascular death was **driven mostly by a significant 29% reduction in time to HF hospitalization**.
- Empagliflozin also resulted in a **significant reduction in total HF hospitalizations, decrease in the slope of the eGFR decline, and a modest improvement in quality of life at 52 weeks.**
- Of note, the benefit was similar **irrespective of the presence or absence of diabetes at baseline**.

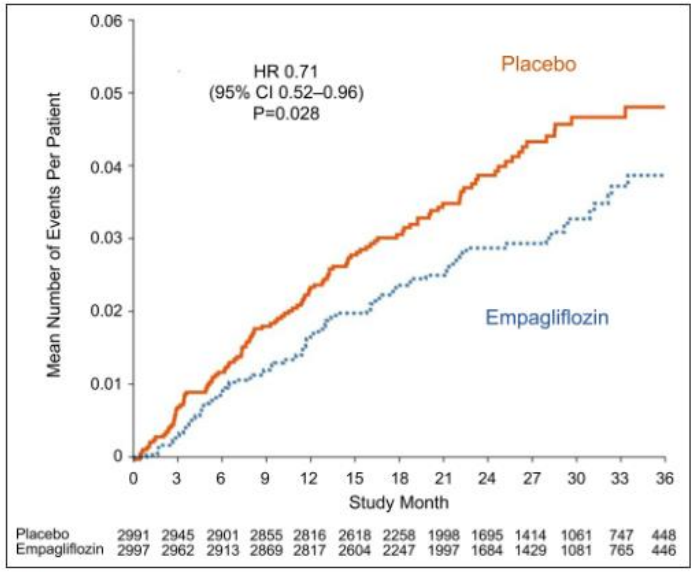


Figure 2. **Total (first and recurrent) adjudicated heart failure hospitalizations requiring admission to cardiac care unit or intensive care unit in the placebo and empagliflozin groups.** Shown are mean cumulative function curves for placebo (shown in red) and for empagliflozin (shown in blue). HR indicates hazard ratio.

HFpEF Management

1. BLOOD PRESSURE CONTROL
2. SGLT2i
3. **Managing Afib with rate or rhythm control in patients with HFpEF**

HFpEF management

Atrial fibrillation (AF)

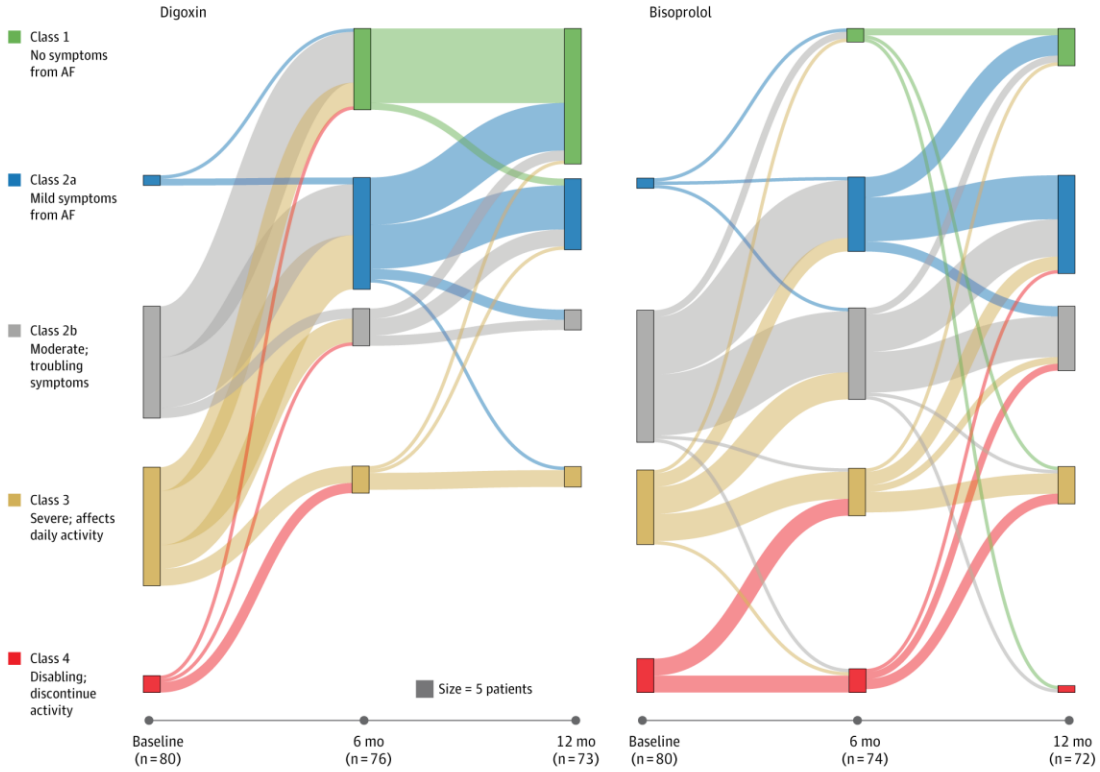
- Large, randomized clinical trial data are unavailable to specifically guide therapy in patients with HFpEF and AF.
- Currently, the comprehensive care of AF can be **extrapolated from the clinical practice guidelines for AF**
- Beta-blockers and nondihydropyridine calcium channel blockers are often considered **first-line agents** for heart rate control in patients with HFpEF

HFpEF Management

Atrial Fibrillation (AF)

- A recent smaller open-label trial, **RATE-AF** (2020) in elderly patients with AF and symptoms of HF compared the use of the beta blocker bisoprolol to digoxin.

- While the primary endpoint of Quality of Life was similar between the 2 groups, several secondary QOL endpoints (functional capacity and reduction in NTproBNP level) *favored digoxin at 12 months*.



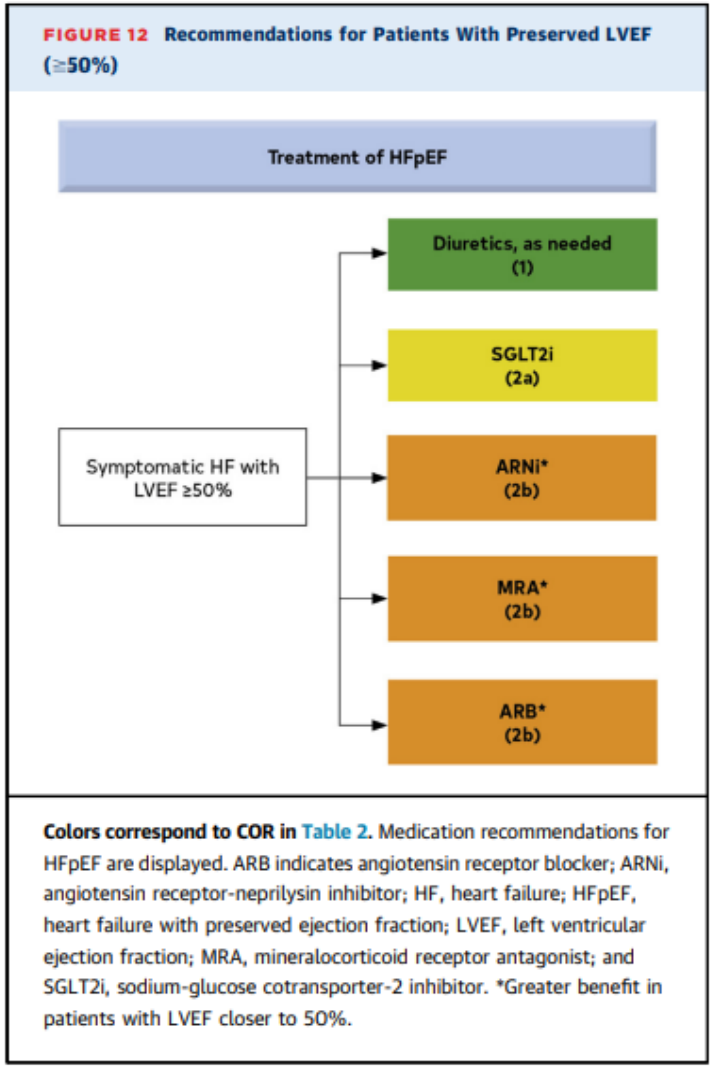
HFpEF Management

1. BLOOD PRESSURE CONTROL
2. SGLT2i
3. Managing Afib with rate or rhythm control in patients with HFpEF
4. **Mineralocorticoid receptor antagonists (MRAs), Angiotensin Receptor Blockers (ARBs), Angiotensin Receptor Neprilysin Inhibitors (ARNIs)**

HFpEF Management

Drug	Example Trial	Rationale
MRA	**TOPCAT**	Investigated the effects of spironolactone (MRA) in patients with HFpEF. The small reduction (HR, 0.89) in the composite of death, aborted cardiac death, and HF hospitalization was NOT statistically significant. Post-hoc analysis suggested that the potential efficacy of spironolactone was greatest at the LOWER end of the LVEF spectrum.
ARB	**CHARM-Preserved**	Patients with EF > 40% were randomized to an ARB, candesartan, or to placebo. The primary endpoint (CV death or HF hospitalization) was not significantly different between the 2 groups (HR, 0.89).
ARNI	**PARAMOUNT-HF**	Sacubitril-valsartan resulted in a lower level of NT-proBNP after 12 weeks of treatment compared with the ARB, valsartan
	PARAGON-HF	In 4822 patients with HFpEF , sacubitril-valsartan compared with valsartan did not achieve a significant reduction in the primary composite endpoint of cardiovascular death or total (first and recurrent) HF hospitalizations.

HFpEF Management Summary

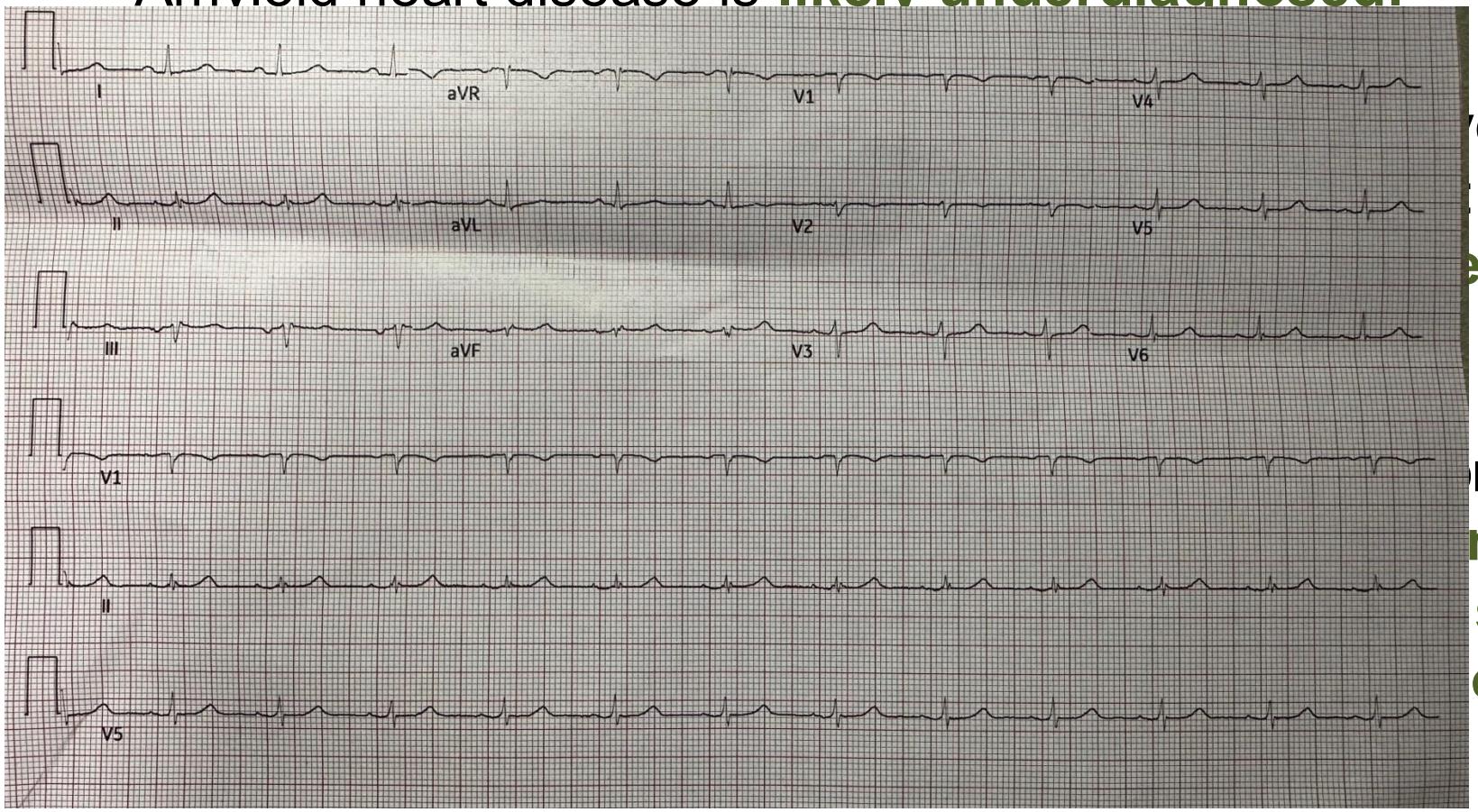


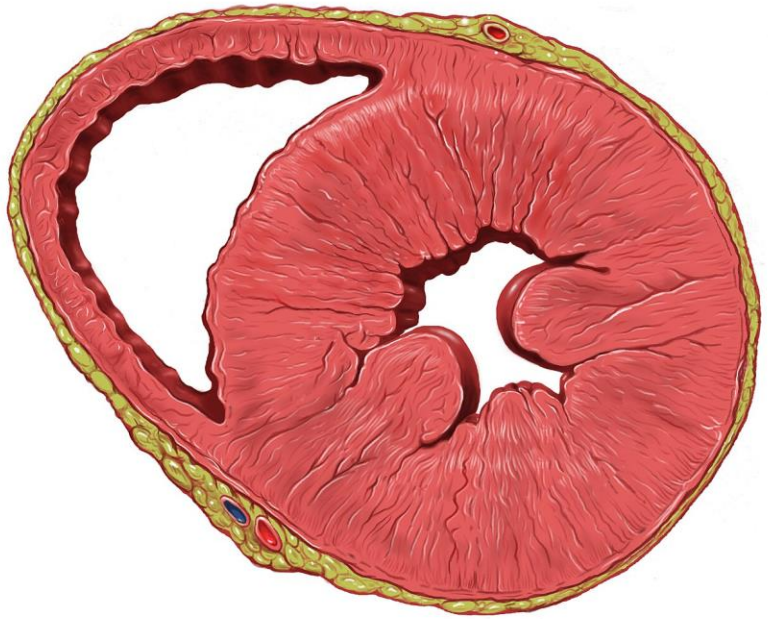
- Control blood pressure
- Treat co-morbidities (weight, DM, OSA, etc)
- Exercise therapy?
- Diuretics
- SGLT2i
- ARNi/MRA/ARB??

Heidenreich P et al AHA/ACC Heart Failure Guidelines 2022

HFpEF – Cardiac Amyloidosis

Amyloid heart disease is **likely underdiagnosed.**

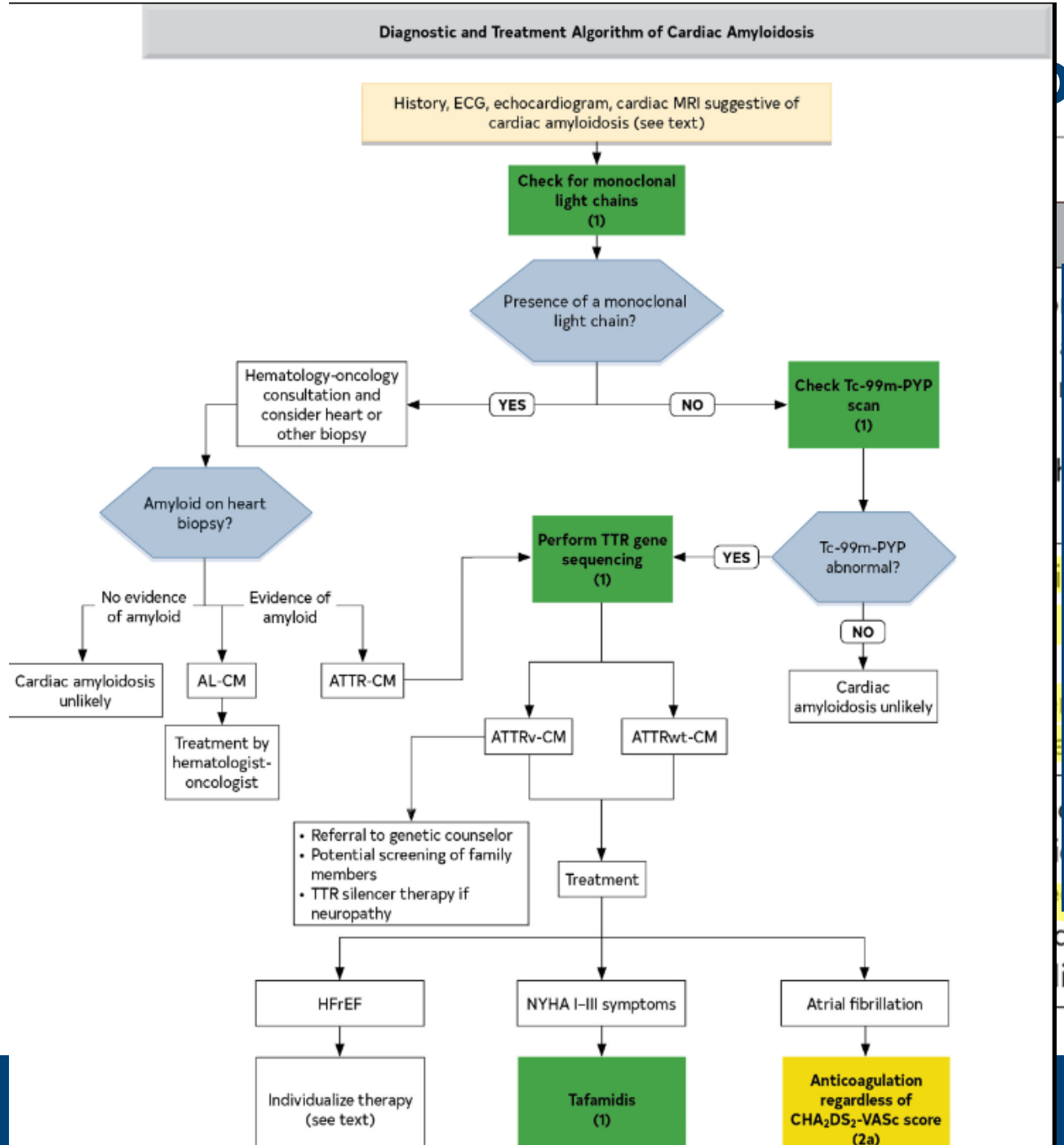




Low Voltage QRS means amplitude <5mm in limb leads OR amplitudes of <10mm in the precordial leads.

Can be caused by a pericardial effusion, infiltrative myocardial disease, obesity, air

osis

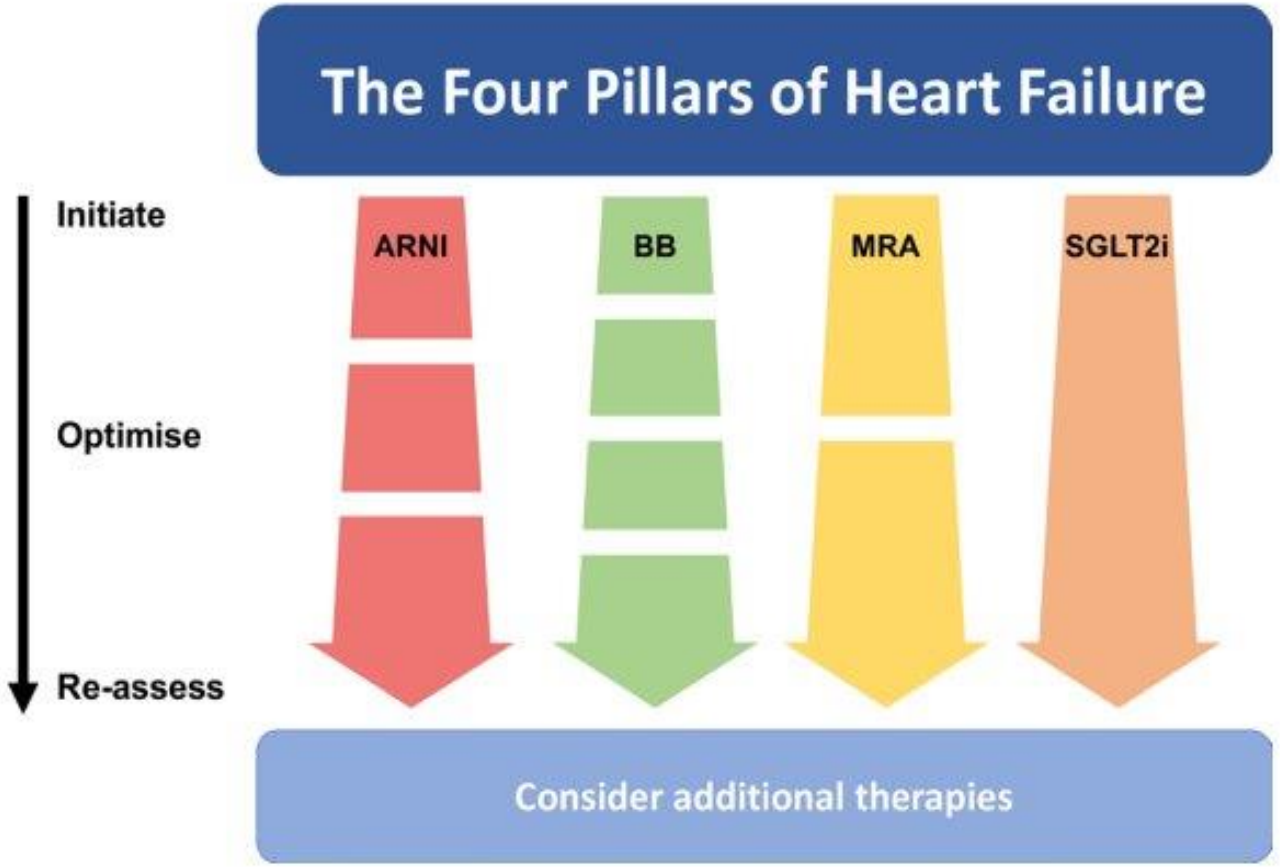


- There are new treatments for cardiac amyloidosis such as transthyretin stabilizer (tafamidis) which is known to improve survival.
- Those with a hereditary form of transthyretin cardiac amyloid should have family members notified and may also benefit from transthyretin silencer therapy for neuropathy.
- Regardless of the genetic result, treatment with tafamidis is recommended if the patient is NYHA class I-III heart failure.

ditary variant from wild-type
iac amyloidosis.[8]

HF with reduced EF (HFrEF) LVEF < 40%

- Complex and common clinical syndrome accounting for **about half of all heart failure hospitalizations** annually in the United States.
- Treatment of HFrEF focuses on targeting the maladaptive neurohormonal alterations



HFrEF Management

1. **Inhibition of the renin-angiotensin system**
2. **Beta-blockers**
3. **Mineralocorticoid Receptor Antagonists (MRAs)**
4. **SGLT2i**
5. Hydralazine and Isosorbide Dinitrate
6. Digoxin
7. ICDs and other Devices

HFrEF Management

1. Inhibition of the renin-angiotensin system

Recommended to reduce morbidity and mortality for patients with HFrEF.
ARNi, ACEi or ARB are recommended as first-line therapy

If patients have chronic, symptomatic HFrEF with NYHA class II or III symptoms and they tolerate an ACEi or ARB, ***they should be switched to an ARNi*** because of improvement in morbidity and mortality.

If patients are switched from an ACEi to an ARNi or vice versa, there should be **at least 36 hours** between ACEi and ARNi doses.

HFrEF Management

1. Inhibition of the renin-angiotensin system

PARADIGM-HF – key ARNi trial

- PARADIGM-HF trial compared the first approved ARNi (sacubitril-valsartan or Entresto) with enalapril in symptomatic patients with HFrEF tolerating an adequate dose of either ACEi or ARB.

- PARADIGM-HF showed that sacubitril-valsartan **SIGNIFICANTLY** reduced the composite endpoint of cardiovascular death or HF hospitalization by **20%** relative to enalapril.

- Use of an ARNi is **more frequently associated with symptomatic hypotension** and a comparable incidence of **angioedema** when compared with enalapril.

HFrEF Management

1. Inhibition of the renin-angiotensin system

Value Statement: High Value (A)		4. In patients with previous or current symptoms of chronic HFrEF, in whom ARNi is not feasible, treatment with an ACEi or ARB provides high economic value.[19–25]
1	**B-R**	5. In patients with chronic symptomatic HFrEF NYHA class II or III who tolerate an ACEi or ARB, replacement by an ARNi is recommended to further reduce morbidity and mortality.[1–5]
Value Statement: High Value (A)		6. In patients with chronic symptomatic HFrEF, treatment with an ARNi instead of an ACEi provides high economic value.[26–29]

HFrEF Management

1. Inhibition of the renin-angiotensin system

Other key trials:

Drug	Key Trial
ARNi	PARADIGM-HF
ACEi	Several key trials: CONSENSUS SOLVD SAVE
ARB	Several key trials: Val-HeFT VALIANT HEAAL

HFrEF Management

1. Inhibition of the renin-angiotensin system

ARNi	Initial Dose	Target Dose
Sacubitril-valsartan	49 mg sacubitril and 51 mg valsartan twice daily (therapy may be initiated at 24 mg sacubitril and 26 mg valsartan twice daily)	97 mg sacubitril and 103 mg valsartan twice daily
Ramipril	1.25–2.5 mg once daily	10 mg once daily
Trandolapril	1 mg once daily	4 mg once daily

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. **Beta blockers (BB)**

- Treatment with beta blockers reduces the risk of death and the combined risk of death or hospitalization in patients with HFrEF.
- BB can improve LVEF, lessen the symptoms of HF, and improve clinical status.
- Benefits of beta blockers have been shown in patients with or without coronary artery disease, and in patients with or without diabetes, older patients, as well as in women and across racial and ethnic groups but not in patient with atrial fibrillation.

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. **Beta blockers (BB)**

THREE beta-blockers have been shown to be effective in reducing the risk of death in patients with HFrEF:

- BISOPROLOL
- SUSTAINED-RELEASE METOPROLOL (succinate)
- CARVEDILOL

Other beta blockers are not included in this recommendation for use.

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. **Beta blockers (BB)**

Utilisation and optimisation of beta-adrenergic receptor blockers over a 6-month period among chronic heart failure patients with reduced ejection fraction

M Kampamba,[1] BPharm, MClinPharm; **P Mweetwa,**[1] BPharm; **W Mufwambi,**[1] BPharm, MClinPharm; **A Hamachila,**[1] MSc, PhD; **J Hangoma,**[2] MClinPharm, PhD

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Corresponding author: *M Kampamba (kampambamartin@gmail.com)*

- Investigated the use of BB in chronic HF patients in a hospital-based retrospective cross-sectional study at the Adult University Teaching Hospital in Lusaka, Zambia.
- 173 study participants. BB were utilized in 101 patients. Among patients who utilized BB, 96 were taking evidence-based BB while the rest were taking atenolol, which is not evidenced-based
- Study showed that **95%** of chronic HR patients were utilizing evidenced based BB and **none** received the optimal dose as recommended in the guidelines.

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HFrEF Management

1. Inhibition of the renin-angiotensin system
2. **Beta blockers (BB)**

COR	LOE	Recommendation
1	A	1. In patients with HFrEF, with current or previous symptoms, use of 1 of the 3 beta blockers proven to reduce mortality (eg, bisoprolol, carvedilol, sustained-release metoprolol succinate) is recommended to reduce mortality and hospitalizations.[1–3]
Value Statement: High Value (A)		2. In patients with HFrEF, with current or previous symptoms, beta-blocker therapy provides high economic value.[4–8]

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. **Mineralocorticoid Receptor Antagonists (MRAs)**

- MRAs show consistent improvements in all-cause mortality, HF hospitalizations, and SCD across a wide range of patients with HFrEF.

- Patients at risk for renal dysfunction or hyperkalemia require close monitoring, and **eGFR ≤30 mL/min/1.73m2** or **serum potassium ≥5.0 mEq/L** are contraindications to MRA initiation

- Eplerenone has higher selectivity for the aldosterone receptor, so adverse effects such as gynecomastia and vaginal bleeding are observed less often in patients who take eplerenone than in those who take spironolactone.

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. **Mineralocorticoid Receptor Antagonists (MRAs)**

Key Trial	Significant Findings
RALES (1999)	• In patients with HFrEF (EF <35%) and NYHA III-IV symptoms, spironolactone led to a 30% reduction in all-cause mortality
EPHESUS (2003)	• Eplerenone reduced the rate of mortality among patients with acute MI complicated by LV dysfunction and HF symptoms.
EMPHASIS-HF (2011)	• Eplerenone reduced the risk of death and hospitalization in patients with moderate systolic dysfunction and NYHA class II symptoms.

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. **Mineralocorticoid Receptor Antagonists (MRAs)**

Recommendations for Mineralocorticoid Receptor Antagonists (MRAs)

COR	LOE	Recommendations
1	A	1. In patients with HFrEF and NYHA class II to IV symptoms, an MRA (spironolactone or eplerenone) is recommended to reduce morbidity and mortality, if eGFR is >30 mL/min/1.73 m² and serum potassium is <5.0 mEq/L. Careful monitoring of potassium, renal function, and diuretic dosing should be performed at initiation and closely monitored thereafter to minimize risk of hyperkalemia and renal insufficiency.[1–3]
Value Statement: High Value (A)		2. In patients with HFrEF and NYHA class II to IV symptoms, MRA therapy provides high economic value.[4–7]

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. **Mineralocorticoid Receptor Antagonists (MRAs)**

	Initial Dose	Target dose
Mineralocorticoid receptor antagonists		
Spironolactone	12.5–25 mg once daily	25–50 mg once daily
Eplerenone	25 mg once daily	50 mg once daily

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. Mineralocorticoid Receptor Antagonists (MRAs)
4. **Sodium Glucose CoTransporter-2 Inhibitors (SGLT2i)**

- Several RCTs in patients with T2DM and either established CVD or high risk for CVD have shown that SGLT2i prevent HF hospitalizations compared with placebo. (CANVAS trial from 2017, DECLARE-TIMI 58 trial from 2018, EMPA-REG OUTCOME trial from 2015)

- The benefit appeared to be *independent* of glucose-lowering effects

- Therefore, several trials were launched to examine the efficacy of SGLT2i on outcomes in patients with HF, irrespective of the presence of type 2 diabetes.

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. Mineralocorticoid Receptor Antagonists (MRAs)
4. **Sodium Glucose CoTransporter-2 Inhibitors (SGLT2i)**

- **DAPA-HF** and **EMPEROR-Reduced** were key randomized controlled trials (RCTs) that showed the benefit of SGLT2i (dapagliflozin and empagliflozin, respectively) versus placebo on outcomes (medium follow-up, 16-18 months)

- Patients enrolled in both trials had ***symptomatic chronic HFrEF*** (LVEF $\leq$ 40%, NYHA class II to IV, and elevated natriuretic peptides) *and were already on GDMT.*

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta blockers (BB)
3. Mineralocorticoid Receptor Antagonists (MRAs)
4. **Sodium Glucose CoTransporter-2 Inhibitors (SGLT2i)**

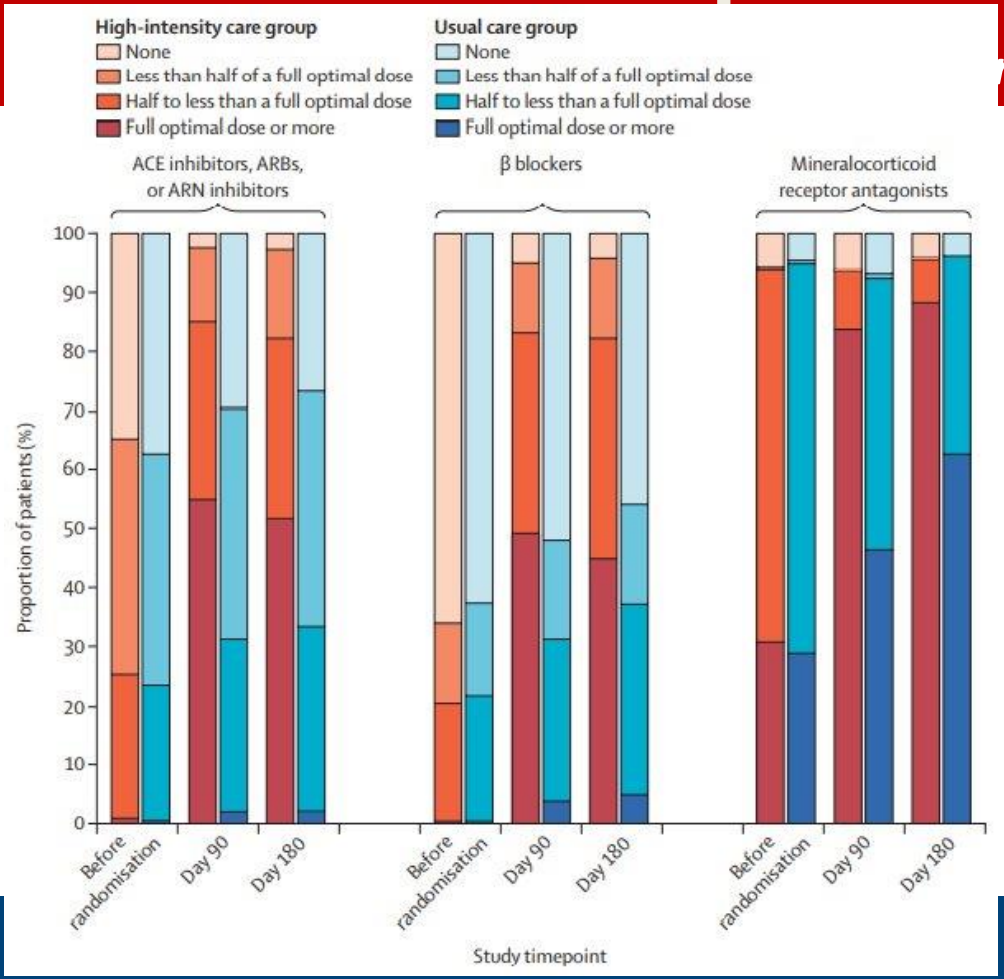
COR	LOE	Recommendation
1	A	1. In patients with symptomatic chronic HFrEF, SGLT2i are recommended to reduce hospitalization for HF and cardiovascular mortality, irrespective of the presence of type 2 diabetes.[1,2]
Value Statement: Intermediate Value (A)		2. In patients with symptomatic chronic HFrEF, SGLT2i therapy provides intermediate economic value.[3,4]

SGLT2i	Initial Dose	Target Dose(s)
Dapagliflozin	10 mg once daily	10 mg once daily
Empagliflozin	10 mg once daily	10 mg once daily

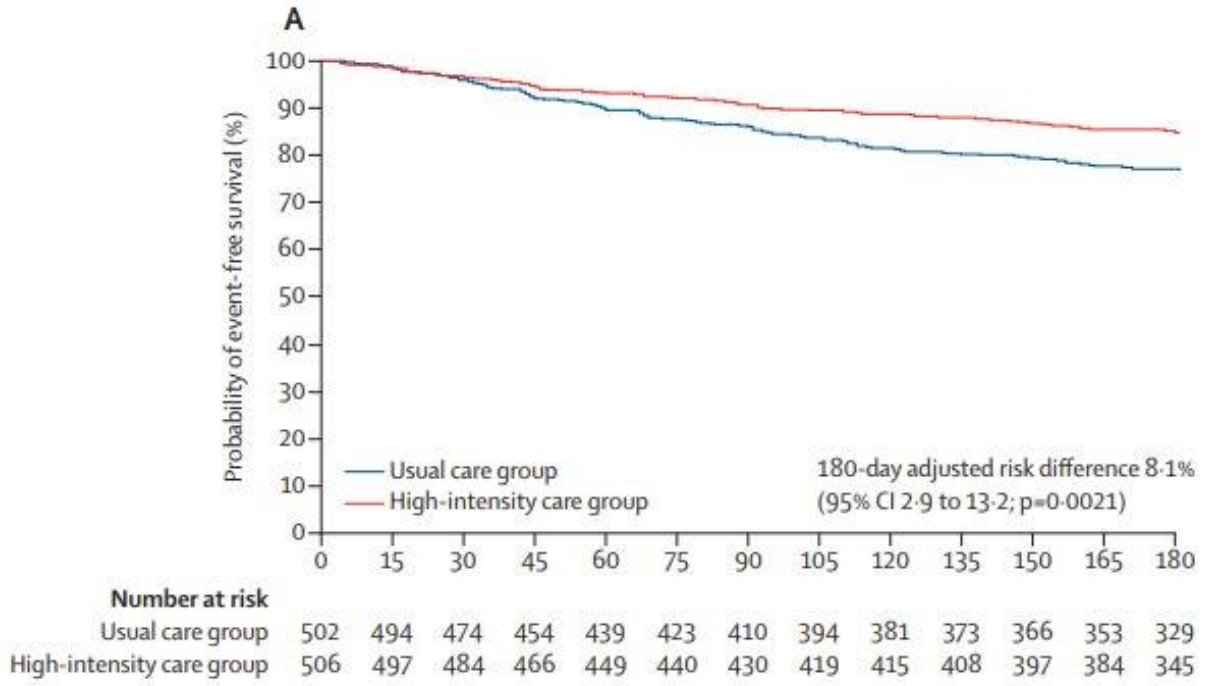
HFrEF Management

STRONG HF: Rapid Titration of HF Medications

riple therapy within 2 weeks



All-Cause Mortality or CHF Hospitalization



Mebazaa A et al Lancet 2022

HFrEF Management

1. Inhibition of the renin-angiotensin system
2. Beta-blockers
3. Mineralocorticoid Receptor Antagonists (MRAs)
4. SGLT2i
5. **Hydralazine and Isosorbide Dinitrate**
6. **Digoxin**
7. **ICDs and other Devices**

HFrEF Management

Hydralazine and Isosorbide Dinitrate

- Two RCTs, V-HeFT and A-HeFT established the benefit of the combination of hydralazine-isosorbide dinitrate in self-identified African Americans

COR	LOE	Recommendations
1	A	1. For patients self-identified as African American with NYHA class III-IV HFrEF who are receiving optimal medical therapy, the combination of hydralazine and isosorbide dinitrate is recommended to improve symptoms and reduce morbidity and mortality.[1,2]

Digoxin

- One large-scale RCT of digoxin in patients with HF The trial was published in 1997 and predated the current GDMT.
- Enrolled patients with NYHA class II to III HF and showed that treatment with digoxin for 2-5 years had no effect on mortality but modestly reduced the combined risk of death and hospitalization

COR	LOE	Recommendation
2b	B-R	1. In patients with symptomatic HFrEF despite GDMT (or who are unable to tolerate GDMT), digoxin might be considered to decrease hospitalizations for HF.[1,2]

HFrEF Management

ICDs (Implantable Cardioverter Defibrillators) and CRTs (Cardiac resynchronization therapy)

Key Trial	Findings
MADIT	Proof-of-priniciple RCT that showed that the ICD saves lives in high-risk patients with CAD
MADIT-II	In post-MI patients with systolic dysfunction (EF ≤ 30%), prophylactic ICD reduced all-cause mortality compared to standard medical therapy
SCD-HeFT	In patients with ischemic and nonischemic cardiomyopathy, LVEF ≤35%, and HF class II to III showed benefit with an ICD compared with either amiodarone or placebo
DANISH	This trial enrolled patients with nonischemic cardiomyopathy and LVEF ≤35% to ICD or standard care. There was no reduction in the primary endpoint of total mortality, but there was a reduction in SCD risk.

HFrEF Management

ICDs (Implantable Cardioverter Defibrillators) and CRTs (Cardiac resynchronization therapy)

Pacing in HF: Cardiac Resynchronization

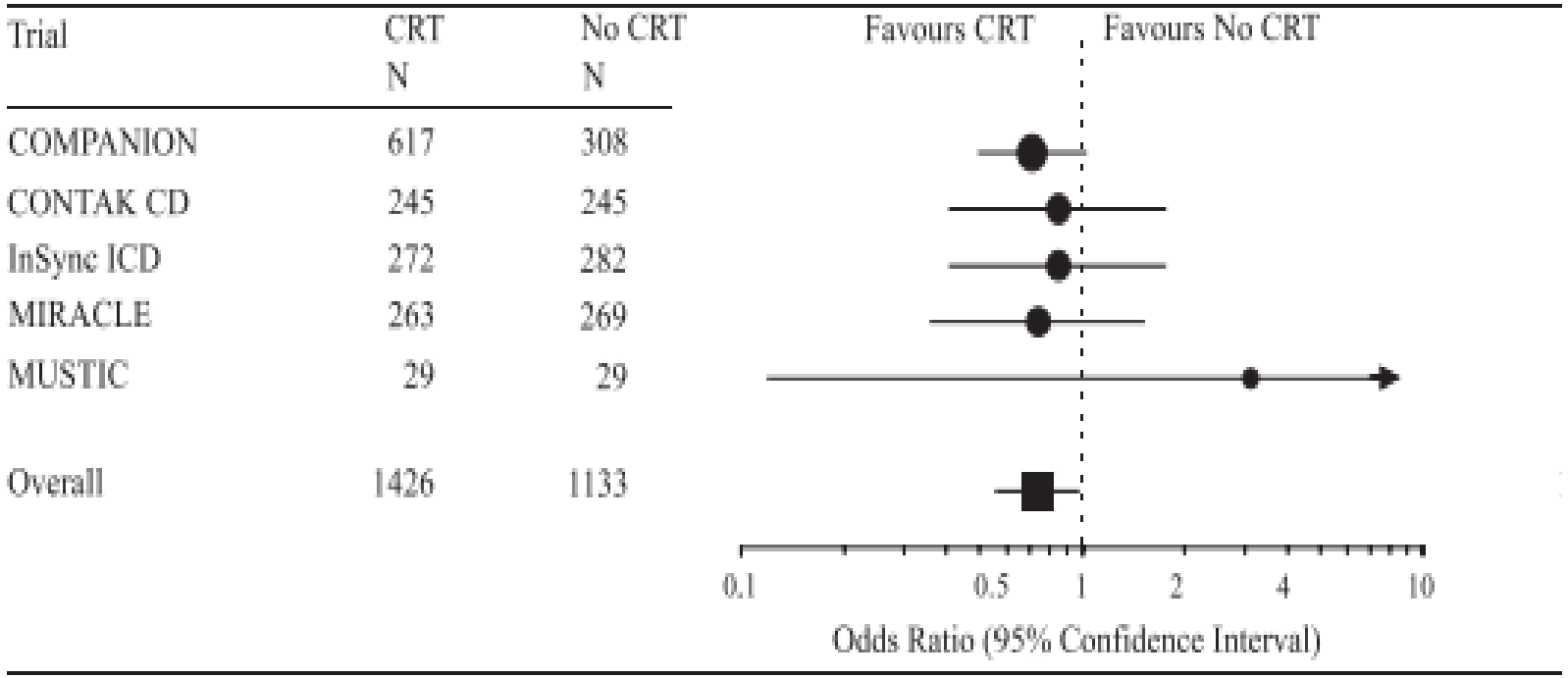
- **Despite optimal GDMT, many patients remain symptomatic**
- **30 to 50% have BBB: poor coordination of ventricular contraction/relaxation**
- **Biventricular pacing: 1 RV, 1 LV (via coronary sinus/cardiac veins)**

HFrEF Management

CRTs (Cardiac resynchronization therapy)

Most of the relevant data for the guidelines of CRT in HF come from seminal trials published from 2002 to 2010:

MIRACLE
CONTAK CD
InSync ICD
MUSTIC
COMPANION



Odds ratios (OR) of all-cause mortality among patients randomised to cardiac resynchronisation therapy (CRT) or n

HFrEF Management

CRTs (Cardiac resynchronization therapy): Meta-Analysis

Study populations from 9 trials:
Low LVEF (most < 35%)
Prolonged QRS (at least >120 msec, often >150 msec)
Mainly NYHA 3 – 4 (85%)

- **Improves symptoms (QOL/NYHA)**
- **Improve 6-minute walk**
- **Decrease HF admissions (Class 3 -4)**
- **Increases LVEF**
- **Reduces mortality (RR 0.79, 95% CI 0.66 – 0.96)**

McAlister, Ann Intern Med,

HFrEF Management

ICDs (Implantable Cardioverter Defibrillators) and CRTs (Cardiac resynchronization therapy)

COR	LOE	Recommendations
1	A	1. In patients with nonischemic DCI heart disease at least 40 days pc LVEF ≤35% and NYHA class II o toms on chronic GDMT, who hav expectation of meaningful surviva ICD therapy is recommended for vention of SCD to reduce total m
1	B-R	3. In patients at least 40 days post-MI with LVEF ≤30% and NYHA class I symptoms while receiving GDMT, who have reasonable expectation of meaningful survival for >1 year, ICD therapy is recommended for primary prevention of SCD to reduce total mortality.[6]
1	B-R	4. For patients who have LVEF ≤35%, sinus rhythm, left bundle branch block (LBBB) with a QRS duration ≥150 ms, and NYHA class II, III, or ambulatory IV symptoms on GDMT, CRT is indicated to reduce total mortality, reduce hospitalizations, and improve symptoms and QOL.[16–21]

McAlister, Ann Intern Med,

HFrEF Management

ICDs (Implantable Cardioverter Defibrillators) and CRTs (Cardiac resynchronization therapy)

2a	B-NR	8. For patients who have LVEF ≤35%, sinus rhythm, LBBB with a QRS duration of 120 to 149 ms, and NYHA class II, III, or ambulatory IV symptoms on GDMT, CRT can be useful to reduce total mortality, reduce hospitalizations, and improve symptoms and QOL.[16–21,28–33]

HFrEF Management

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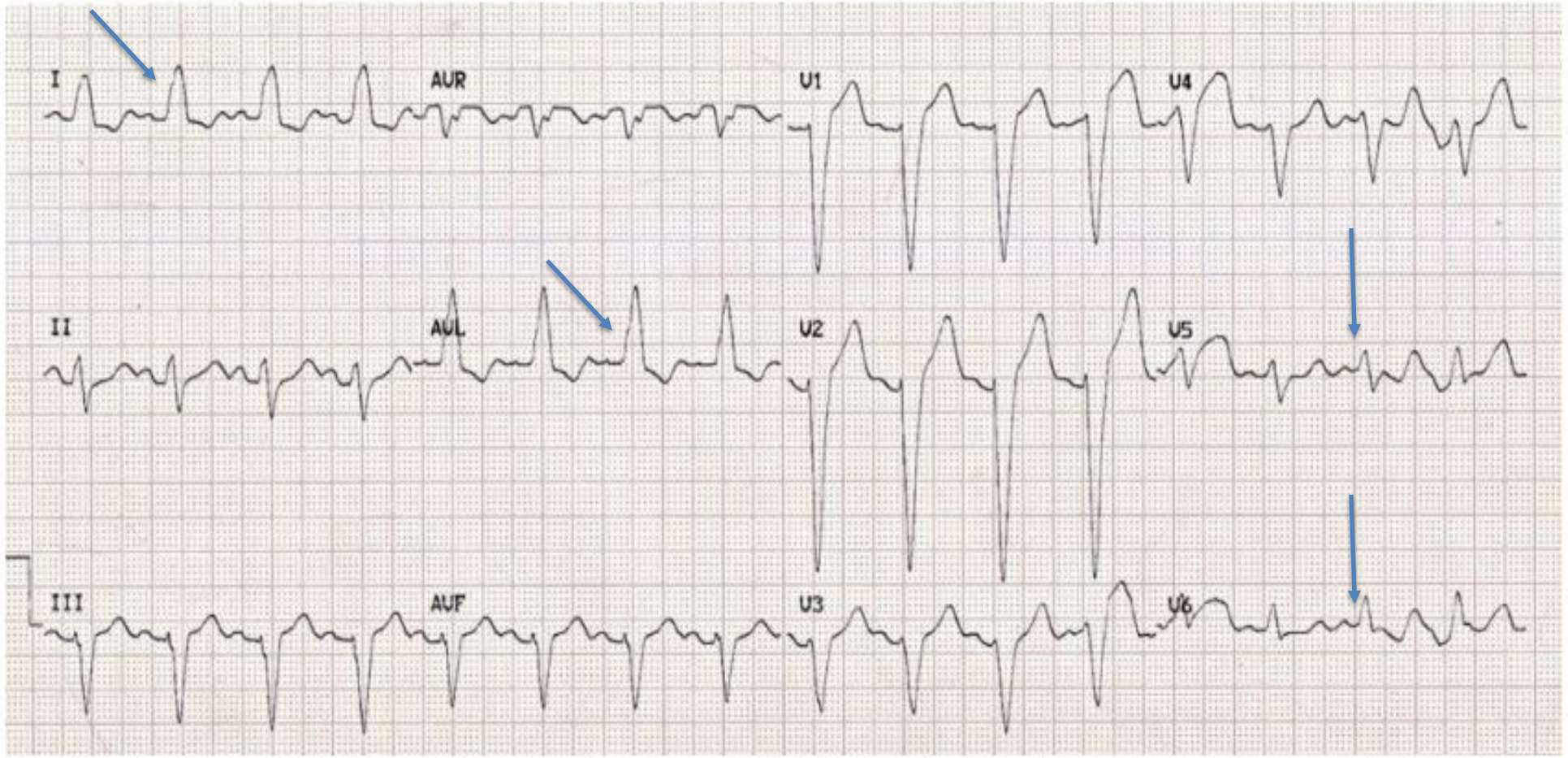

HFrEF Management – Other considerations

Treatment of Iron Deficiency

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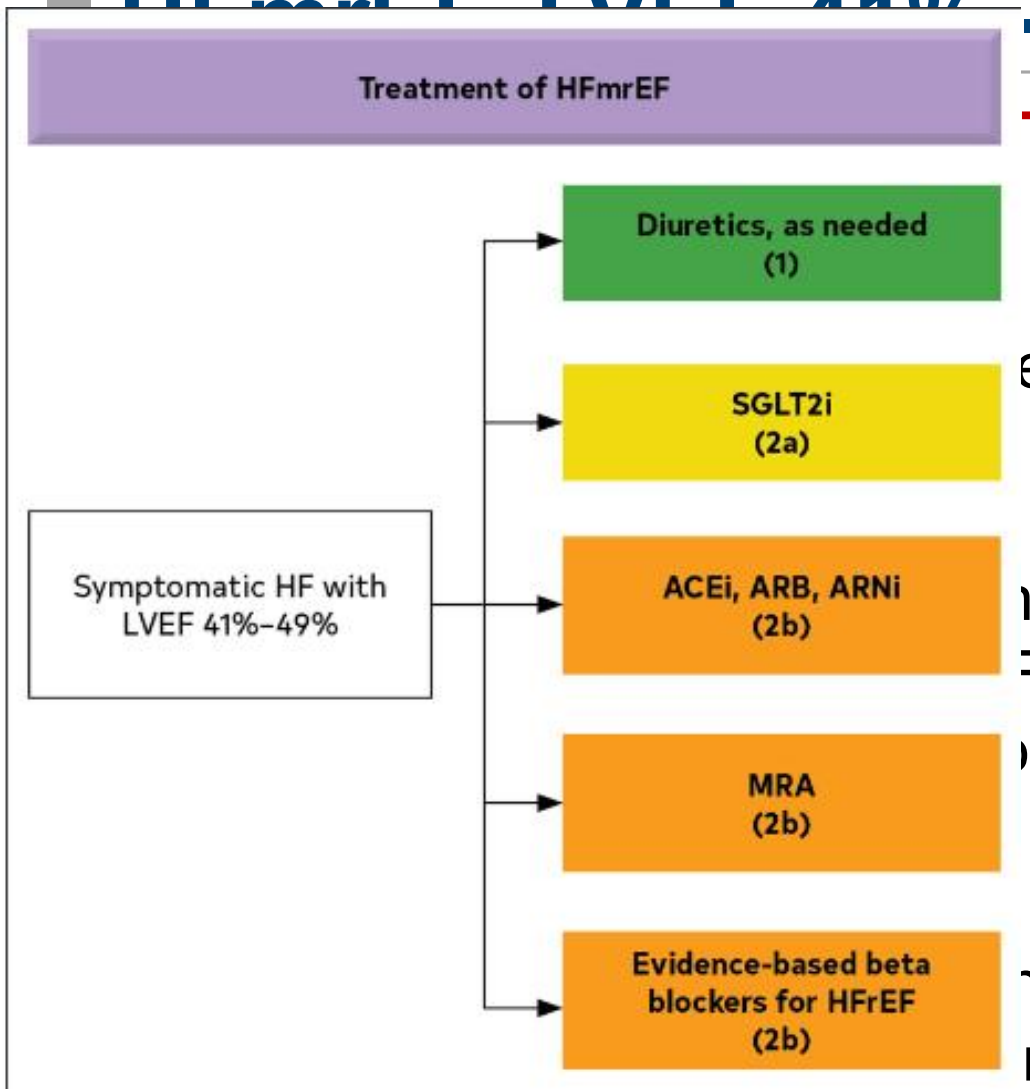
COR	LOE	Recommendations
Management of Anemia or Iron Deficiency		
2a	B-R	1. In patients with HFrEF and iron deficiency with or without anemia, intravenous iron replacement is reasonable to improve functional status and QOL.[1–4]
3: Harm	B-R	2. In patients with HF and anemia, erythropoietin-stimulating agents should not be used to improve morbidity and mortality.[5,6]

- 49%



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COR	LOE	Recommendations
2a	B-R	1. In patients with HFmrEF, SGLT2i can be beneficial in decreasing HF hospitalizations and cardiovascular mortality.[1]
2b	B-NR	2. Among patients with current or previous symptomatic HFmrEF (LVEF, 41%–49%), use of evidence-based beta blockers for HFrEF, ARNi, ACEi, or ARB, and MRAs may be considered to reduce the risk of HF hospitalization and cardiovascular mortality, particularly among patients with LVEF on the lower end of this spectrum.[2–9]

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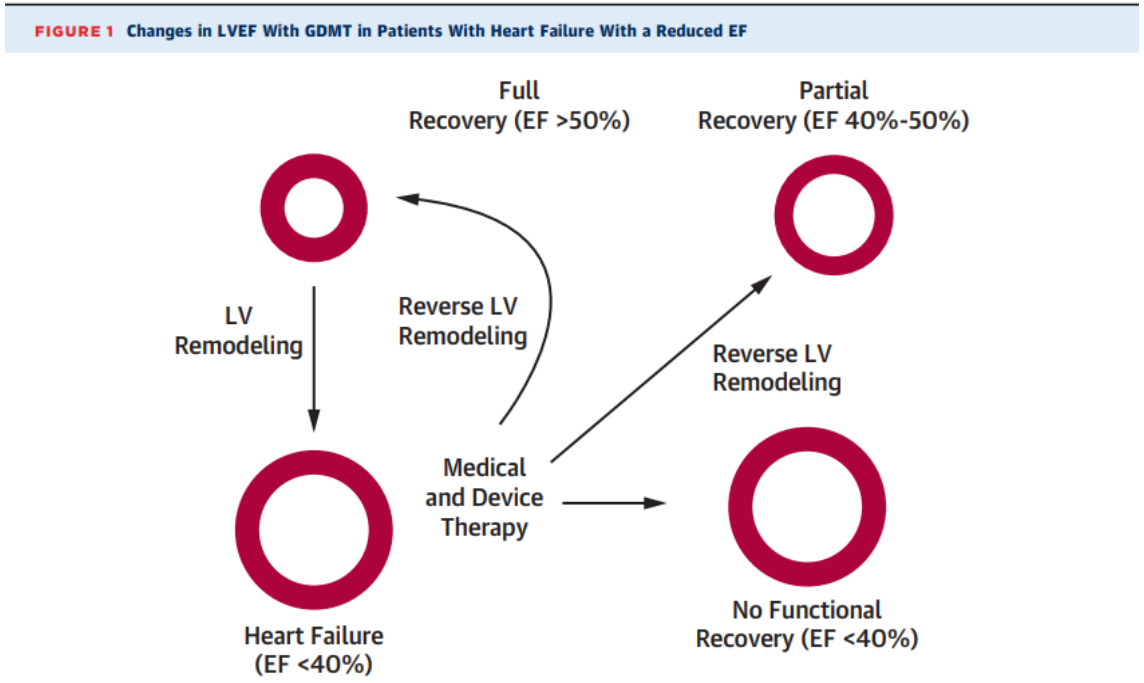
Heart Failure with Improved LVEF (HFimpEF)

- Reverse LV remodeling and recovery of left ventricular function are associated with **improved clinical outcomes**

- Among patients who experience a complete normalization of LV structure and function after implementation of GDMT, **a significant proportion will develop recurrent LV dysfunction accompanied by recurrent HF events**



Wilcox et al. HFrecEF Consensus Recommendations. 2020.

HFimpEF – management when EF recovers

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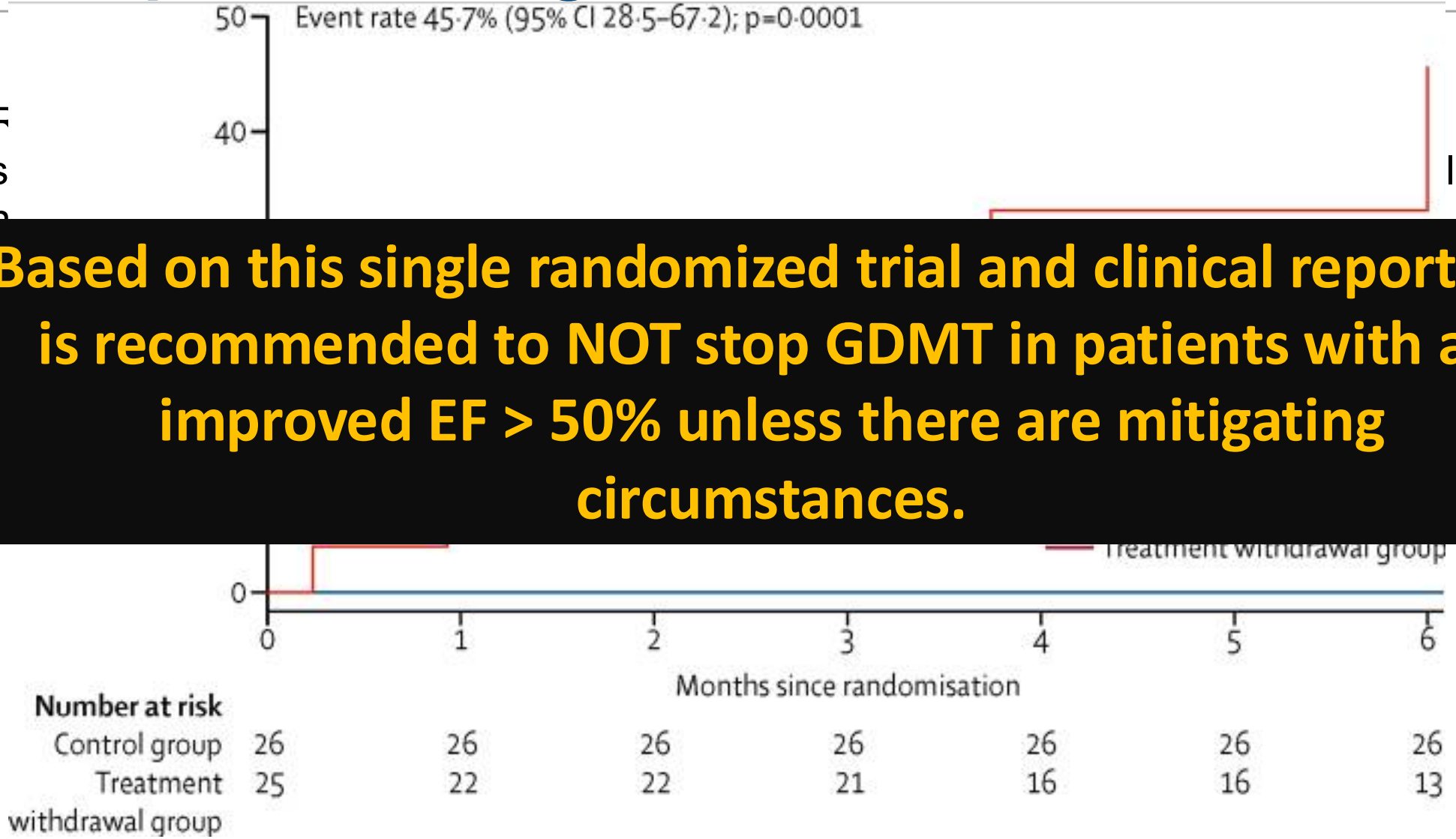
Based on this single randomized trial and clinical reports, it is recommended to NOT stop GDMT in patients with an improved EF > 50% unless there are mitigating circumstances.



Heart Failure with Improved LVEF.

COR	LOE	Recommendation
1	B-R	1. In patients with HFimpEF after treatment, GDMT should be continued to prevent relapse of HF and LV dysfunction, even in patients who may become asymptomatic.[1]

Advanced Heart Failure

A subset of patients with chronic HF will continue to progress and develop persistently severe symptoms despite maximum GDMT.

Before consideration of a referral to an advanced heart failure specialist it is important to:

- ✓ **Determine that heart failure and NOT concomitant pulmonary disorder is the basis for the dyspnea**
- ✓ **Evaluate the patients for non-adherence to medications**
- ✓ **Carefully review medical management to verify that all therapies likely to improve clinical status have been considered**

Advanced Heart Failure

Acronyms such as "I NEED HELP" have been developed to assist in decision-making for referral to advanced heart failure.

- **I, Intravenous inotropes**
- **N, New York Heart Association (NYHA) class IIIB to IV or persistently elevated natriuretic peptides**
- **E, End-organ dysfunction**
- **E, EF ≤35%**
- **D, Defibrillator shocks**
- **H, Hospitalizations >1**
- **E, Edema despite escalating diuretics**
- **L, Low systolic BP ≤90, high heart rate**
- **P, Prognostic medication; progressive intolerance or down-titration of GDMT**

Post Questions

Questions?