Heart Failure 2025 Update

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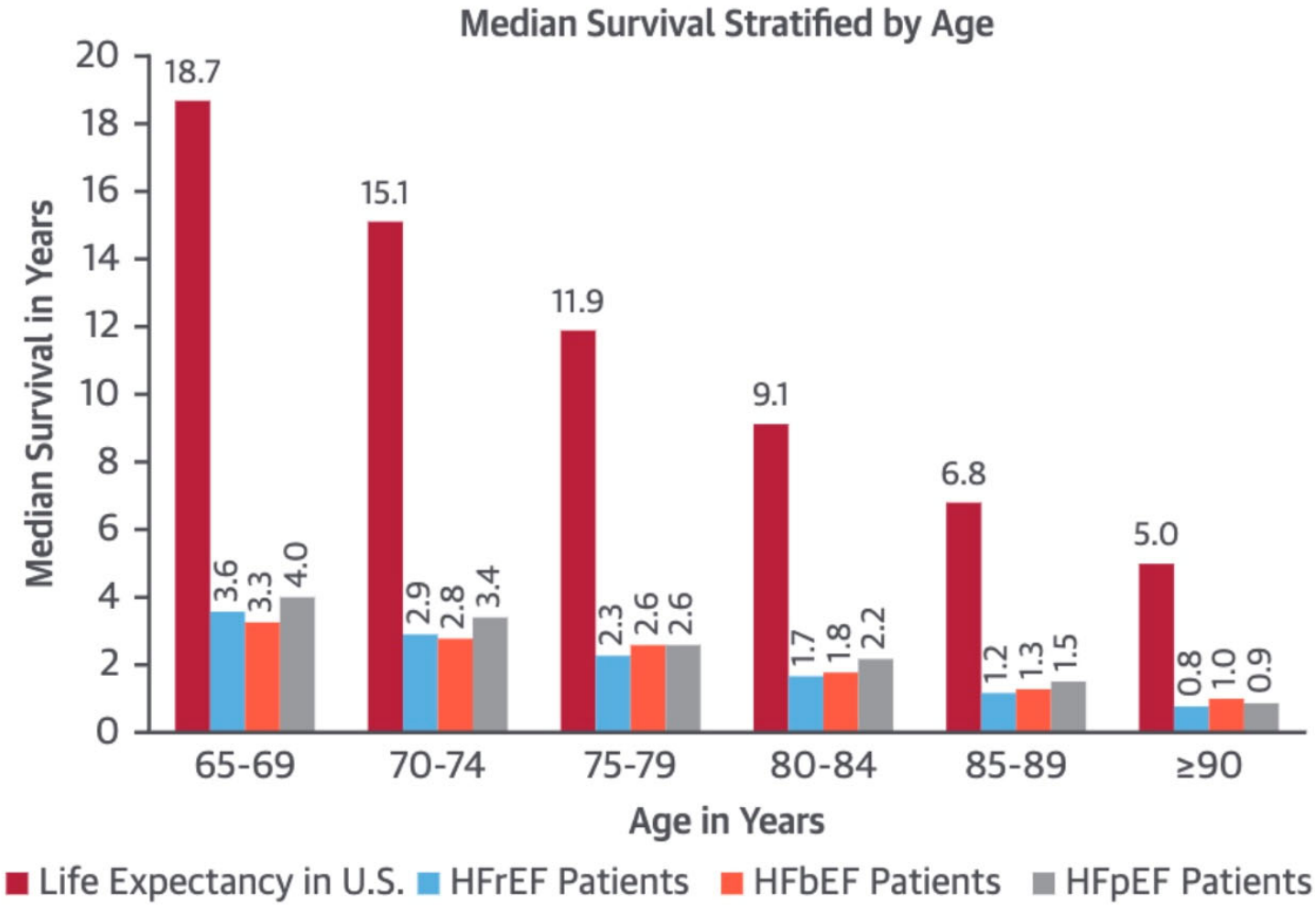
Scope of the Problem

- The lifetime risk of HF has increased to 24% (1 in 4 persons will develop HF in their lifetime)
- Approximately 6.7 million Americans over 20 years of age have HF, and the prevalence is expected to rise to 8.5 million Americans by 2030.
- Approximately 33% of the US adult population without known symptomatic HF is at-risk for HF (Stage A HF) and 24%–34% have pre-HF (Stage B HF).
- The prevalence of HF with preserved ejection fraction (HFpEF) across populations is increasing, with significant differences by race and ethnicity, and men experience a higher lifetime risk HFpEF.



Shah, K, Xu, H, Matsouaka, R. et al. Heart Failure With Preserved, Borderline, and Reduced Ejection Fraction: 5-Year Outcomes. *J Am Coll Cardiol.* 2017 Nov, 70 (20) 2476–2486.
https://doi.org/10.1016/j.jacc.2017.08.074
https://doi.org/10.1016%2Fj.cardfail.2023.07.006

Definition of HF

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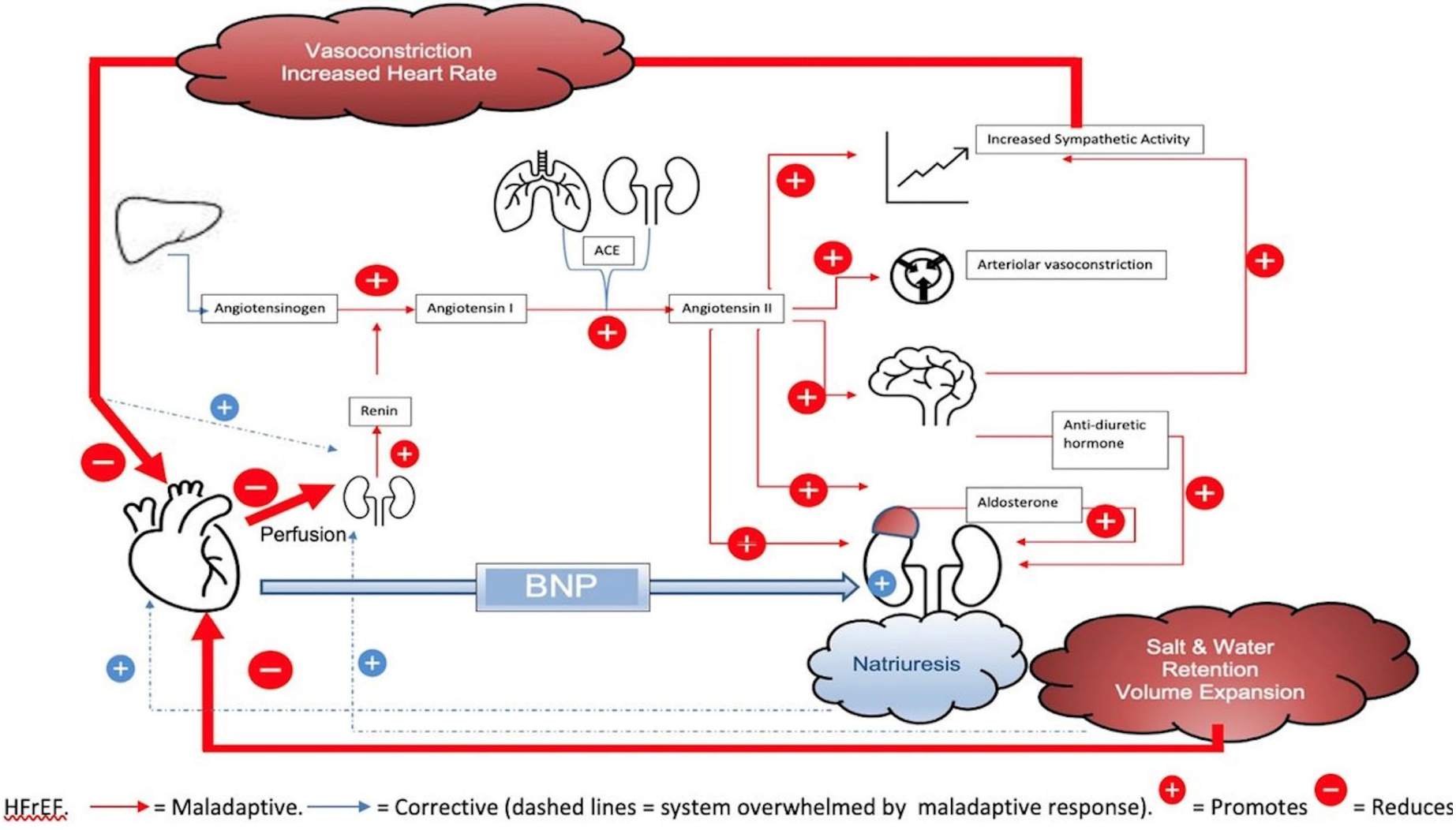

https://doi.org/10.1136/heartjnl-2020-318811

STAGE A HF- AT RISK

At risk for HF but without symptoms, structural heart disease, or cardiac biomarkers of stretch or injury (e.g., patients with hypertension, atherosclerotic CVD, diabetes, metabolic syndrome and obesity, exposure to cardiotoxic agents, genetic variant for cardiomyopathy, or positive family history of cardiomyopathy).

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STAGE B HF - ASYMPTOMATIC HF

No symptoms or signs of HF, but evidence of 1 of the following:

Structural heart disease*

- Reduced left or right ventricular systolic function
  - Reduced ejection fraction, reduced strain
- Ventricular hypertrophy
- Chamber enlargement
- Wall motion abnormalities
- Valvular heart disease

Evidence for increased filling pressures*

- By invasive hemodynamic measurements
- By noninvasive imaging suggesting elevated filling pressures (e.g., Doppler echocardiography)

Patients with risk factors and biomarkers

- *Increased levels of BNPs* or*
- *Persistently elevated cardiac troponin*

in the absence of competing diagnoses resulting in such biomarker elevations such as acute coronary syndrome, CKD, pulmonary embolus, or myopericarditis

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STAGE C HF - SYMPTOMATIC HF

Structural heart disease with current or previous symptoms of HF.

STAGE D HF - ADVANCED HF

Marked HF symptoms that interfere with daily life and with recurrent hospitalizations despite attempts to optimize GDMT.

Classification of HF by EF

HFrEF (HF with reduced EF)	LVEF ≤40%
HFimpEF (HF with improved EF)	Previous LVEF ≤40% and a follow-up measurement of LVEF >40%
HFmrEF (HF with mildly reduced EF)	LVEF 41%–49%
HFpEF (HF with preserved EF)	LVEF ≥50% Evidence of spontaneous or provokable increased LV filling pressures (e.g., elevated natriuretic peptide, noninvasive and invasive hemodynamic measurement)

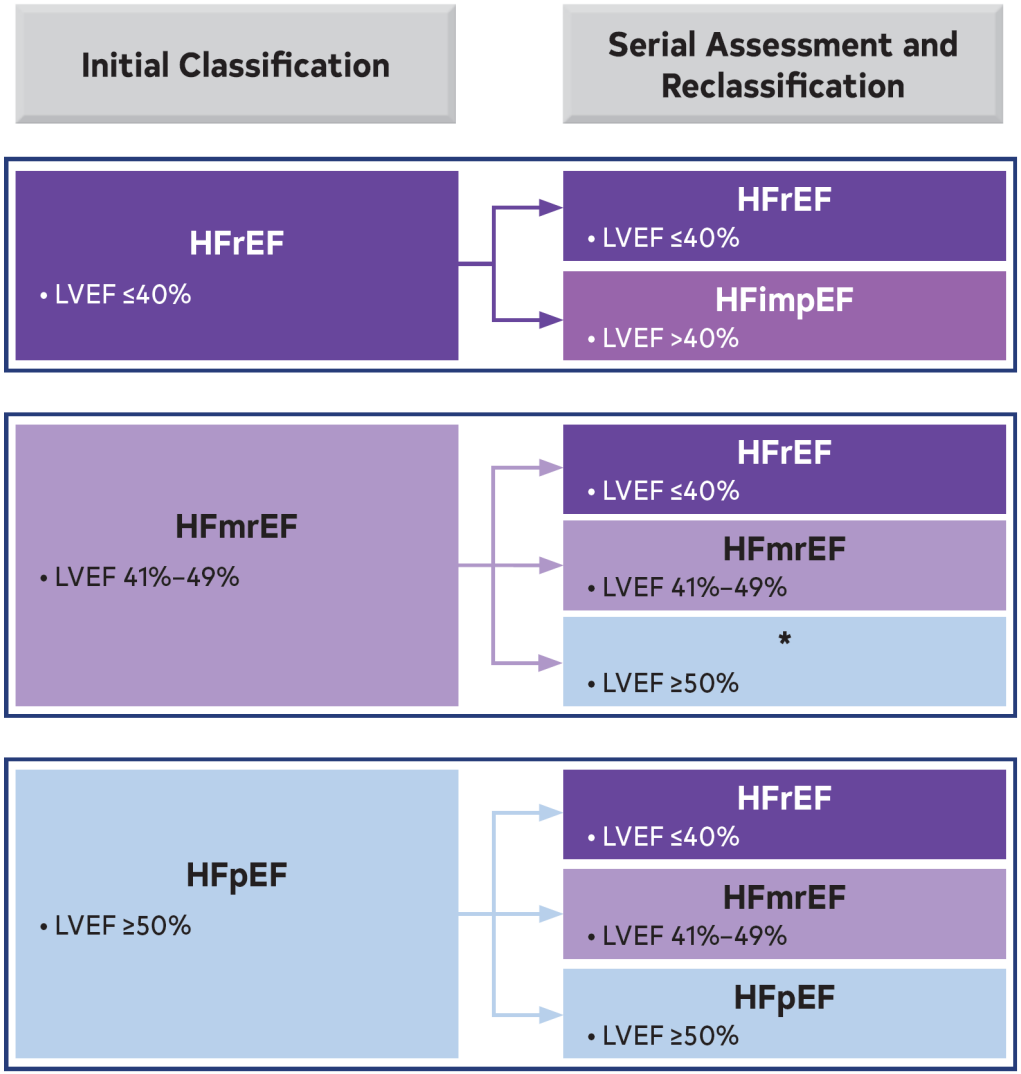

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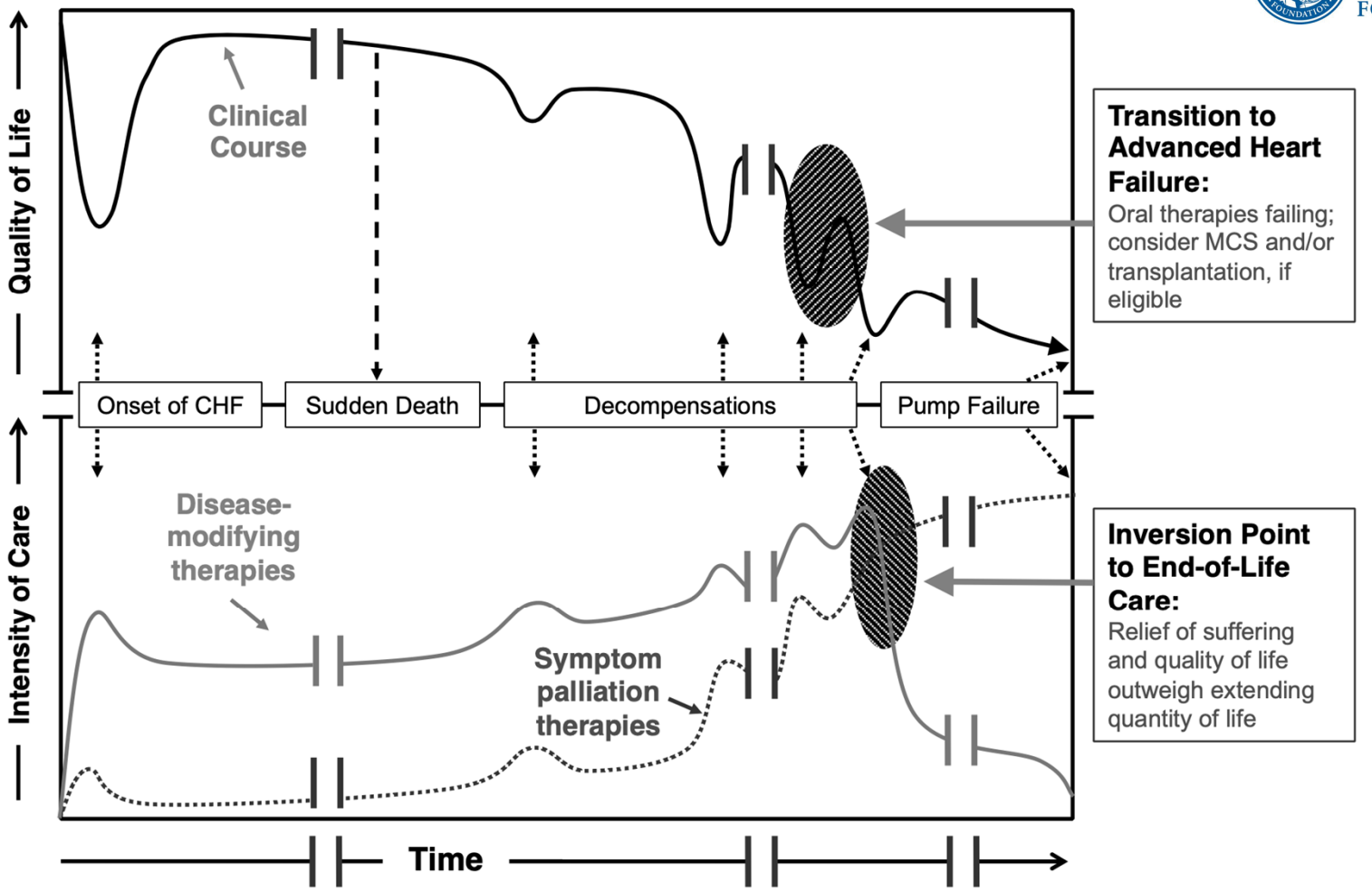
Table 3
NYHA classification

NYHA class	Level of impairment
I	No limitation of physical activity. Ordinary physical activity does not cause undue breathlessness, fatigue or palpitations.
II	Slight limitation of physical activity. Comfortable at rest but ordinary physical activity results in undue breathlessness, fatigue or palpitations.
III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary physical activity results in undue breathlessness, fatigue or palpitations.
IV	Unable to carry out any physical activity without discomfort. Symptoms at rest can be present. If any physical activity is undertaken, discomfort is increased.

- NYHA, New York Heart Association.


Quality of Life
Clinical Course
Onset of CHF
Sudden Death
Decompensations
Pump Failure
Intensity of Care
Disease-modifying therapies
Symptom palliation therapies
Time
Transition to Advanced Heart Failure:
Oral therapies failing; consider MCS and/or transplantation, if eligible
Inversion Point to End-of-Life Care:
Relief of suffering and quality of life outweigh extending quantity of life

Initial/Serial Evaluation

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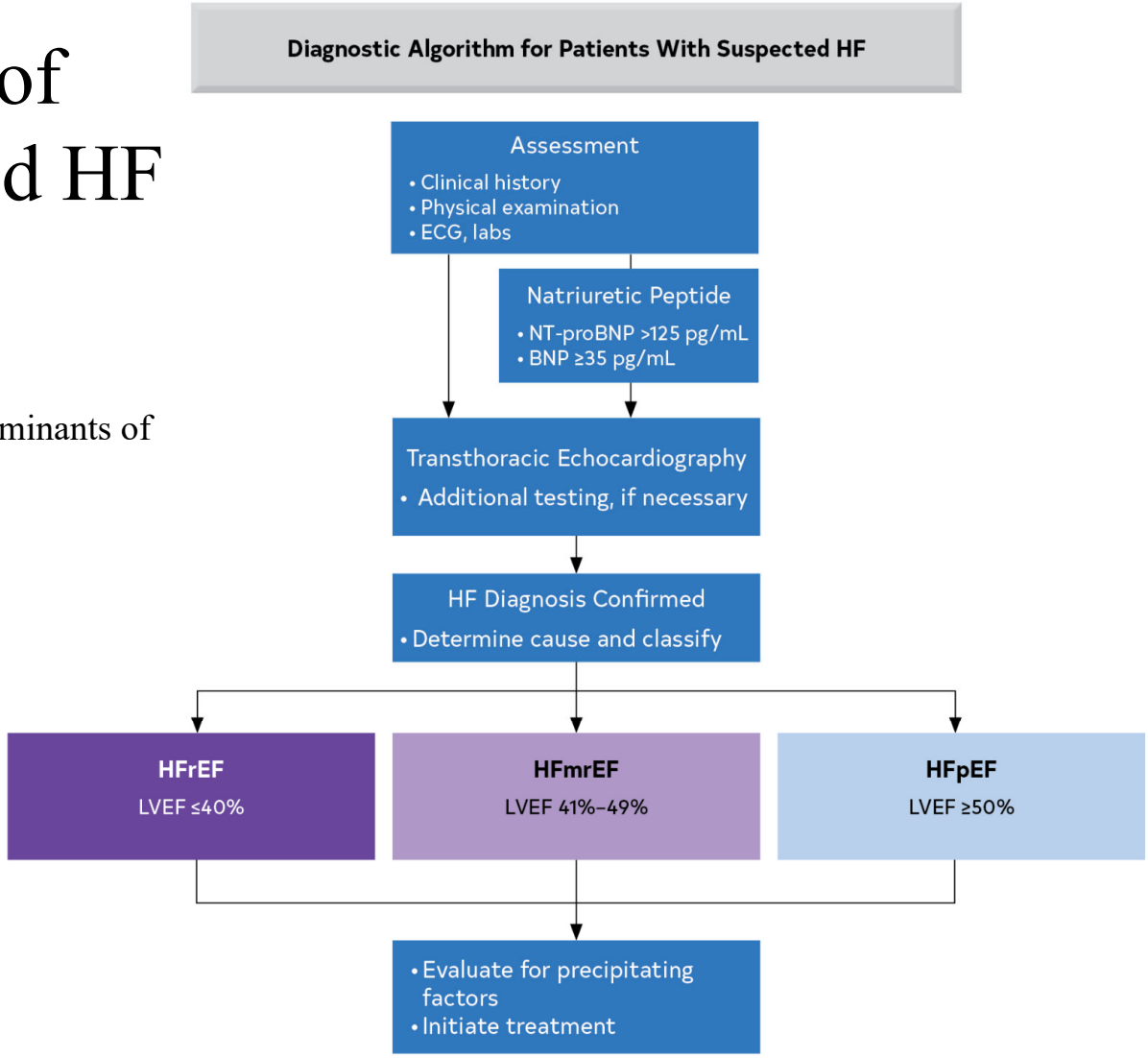
Initial Evaluation of Patient with Suspected HF

- History
- Family history
- Identification of risk factors, behaviors, social determinants of health
- Examination
- 12 lead ECG
- Labs (CBC, CMP, TSH, UA, iron studies, lipids)
  - BNP or Pro-BNP
- CXR
- Echocardiogram
- Other imaging if echo is inadequate
- HF Risk Assessment



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Stage A (Patients at Risk for HF)

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Management of Stage A

- Manage blood pressure
- SGLT2i for those with DM and CVD or high risk for HF
- Lifestyle Modification
  - Exercise, diet, tobacco cessation, weight loss, etc
- Consider screening BNP

Stage B (Pre-HF)

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Management of Stage B: Preventing the Syndrome of Clinical HF in Patients With Pre-HF

1	**In patients with LVEF ≤40%, ACEi should be used to prevent symptomatic HF and reduce mortality.**
1	**In patients with a recent or remote history of MI or ACS, statins should be used to prevent symptomatic HF and adverse cardiovascular events.**
1	**In patients with a LVEF ≤40%, evidence-based beta blockers should be used to prevent symptomatic HF and/or reduce mortality.**

Management of Stage B: Preventing the Syndrome of Clinical HF in Patients With Pre-HF

1	In patients who are at least 40 days post-MI with LVEF ≤30% and NYHA class I symptoms while receiving GDMT and have reasonable expectation of meaningful survival for >1 year, an ICD is recommended for primary prevention of sudden cardiac death (SCD) to reduce total mortality.
3: Harm	In patients with LVEF <50%, thiazolidinediones should not be used because they increase the risk of HF, including hospitalizations.
3: Harm	In patients with LVEF <50%, nondihydropyridine calcium channel blockers with negative inotropic effects may be harmful.

Stage C HF

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1

Patients with HF should receive care from multidisciplinary teams to facilitate the implementation of GDMT, address potential barriers to self-care, reduce the risk of subsequent rehospitalization for HF, and improve survival.

Nonpharmacological Interventions

Sodium/Salt restriction

Vaccinations against respiratory diseases

Screening for depression, frailty, social isolation

Diet/exercise education, medication adherence education

Exercise Training

Cardiac Rehabilitation

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Diuretics

1

In patients with HF who have fluid retention, diuretics are recommended to relieve congestion, improve symptoms, and prevent worsening HF.

1

For patients with HF and congestive symptoms, addition of a thiazide (e.g., metolazone) to treatment with a loop diuretic should be reserved for patients who do not respond to moderate- or high-dose loop diuretics to minimize electrolyte abnormalities.

Drug	Initial Daily Dose	Maximum Total Daily Dose	Duration of Action
Loop diuretics			
Bumetanide	0.5–1.0 mg once or twice	10 mg	4–6 h
Furosemide	20–40 mg once or twice	600 mg	6–8 h
Torsemide	10–20 mg once	200 mg	12–16 h
Thiazide diuretics			
Chlorthiazide	250–500 mg once or twice	1000 mg	6–12 h
Chlorthalidone	12.5–25 mg once	100 mg	24–72 h
Hydrochlorothiazide	25 mg once or twice	200 mg	6–12 h
Indapamide	2.5 mg once	5 mg	36 h
Metolazone	2.5 mg once	20 mg	12–24 h

Renin-Angiotensin System Inhibition

- ARNI is now 1st line
- ACEI when ARNI is not feasible
- ARB when ARNI and ACEI is not feasible
- If symptomatic on ACEI or ARB, switch to ARNI if possible
- ARNI and ACEI should be avoided in those with history of angioedema

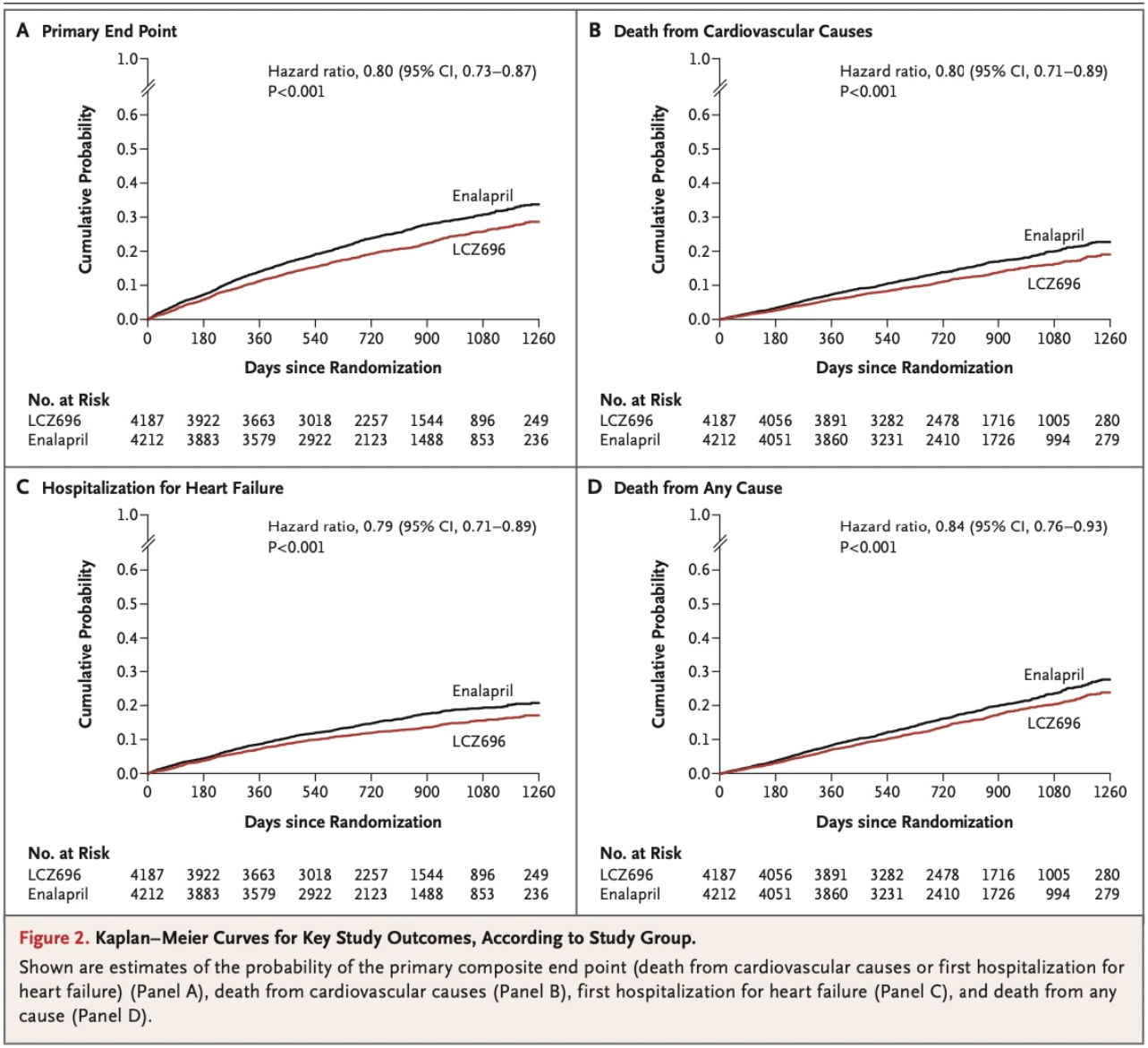


Figure 2. Kaplan–Meier Curves for Key Study Outcomes, According to Study Group.

Shown are estimates of the probability of the primary composite end point (death from cardiovascular causes or first hospitalization for heart failure) (Panel A), death from cardiovascular causes (Panel B), first hospitalization for heart failure (Panel C), and death from any cause (Panel D).

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 SEPTEMBER 11, 2014 VOL. 371 NO. 11

Angiotensin–Neprilysin Inhibition versus Enalapril in Heart Failure

John J.V. McMurray, M.D., Milton Packer, M.D., Akshay S. Desai, M.D., M.P.H., Jianjian Gong, Ph.D., Martin P. Lefkowitz, M.D., Adel R. Rizkala, Pharm.D., Jean L. Rouleau, M.D., Victor C. Shi, M.D., Scott D. Solomon, M.D., Karl Swedberg, M.D., Ph.D., and Michael R. Zile, M.D., for the PARADIGM-HF Investigators and Committees*

Beta Blockers

1

In patients with HFrEF, with current or previous symptoms, use of 1 of the 3 beta blockers proven to reduce mortality (e.g., bisoprolol, carvedilol, sustained-release metoprolol succinate) is recommended to reduce mortality and hospitalizations.

Beta Blockers

Drug	Initial Daily Dose	Target Dose	Mean Dose in Trials
Bisoprolol	1.25 mg once daily	10 mg once daily	8.6 mg total daily
Carvedilol	3.125 mg twice daily	25–50 mg twice daily	37 mg total daily
Carvedilol CR	10 mg once daily	80 mg once daily	NA
Metoprolol succinate extended release (metoprolol CR/XL)	12.5–25 mg once daily	200 mg once daily	159 mg total daily

Mineralocorticoid Receptor Antagonists

1

In patients with HFrEF and NYHA class II-IV symptoms, an MRA (spironolactone or eplerenone) is recommended to reduce morbidity and mortality, if eGFR is >30 mL/min/1.73 m^2 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.

3: Harm

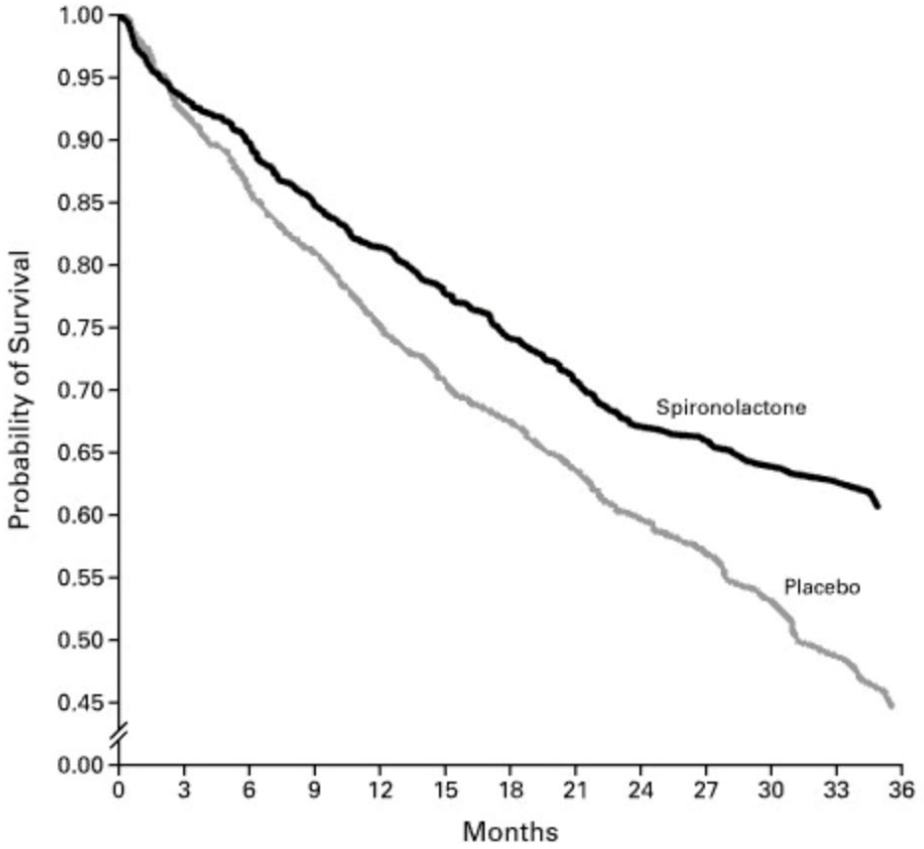
In patients taking MRA whose serum potassium cannot be maintained at <5.5 mEq/L, MRA should be discontinued to avoid life-threatening hyperkalemia.

The New England
Journal of Medicine

VOLUME 341 SEPTEMBER 2, 1999 NUMBER 10

THE EFFECT OF SPIRONOLACTONE ON MORBIDITY AND MORTALITY IN PATIENTS WITH SEVERE HEART FAILURE

BERTRAM PITT, M.D., FAIEZ ZANNAD, M.D., WILLEM J. REMME, M.D., ROBERT CODY, M.D., ALAIN CASTAIGNE, M.D., ALFONSO PEREZ, M.D., JOLIE PALENSKY, M.S., AND JANET WITTES, PH.D., FOR THE RANDOMIZED ALDACTONE EVALUATION STUDY INVESTIGATORS*



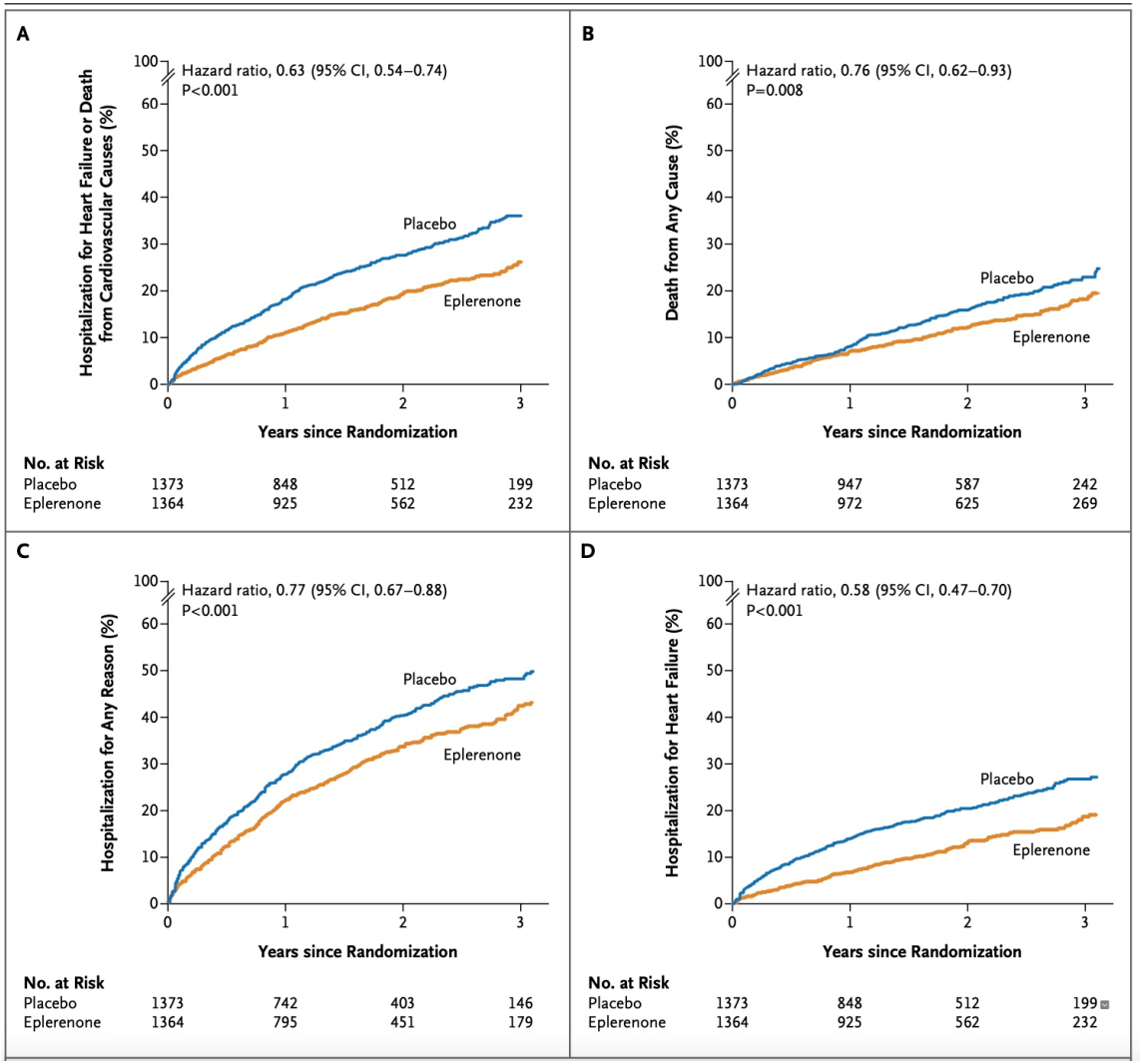
No. at Risk													
Placebo	841	775	723	678	628	592	565	483	379	280	179	92	36
Spironolactone	822	766	739	698	669	639	608	526	419	316	193	122	43

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 6, 2011 VOL. 364 NO. 1

Eplerenone in Patients with Systolic Heart Failure and Mild Symptoms

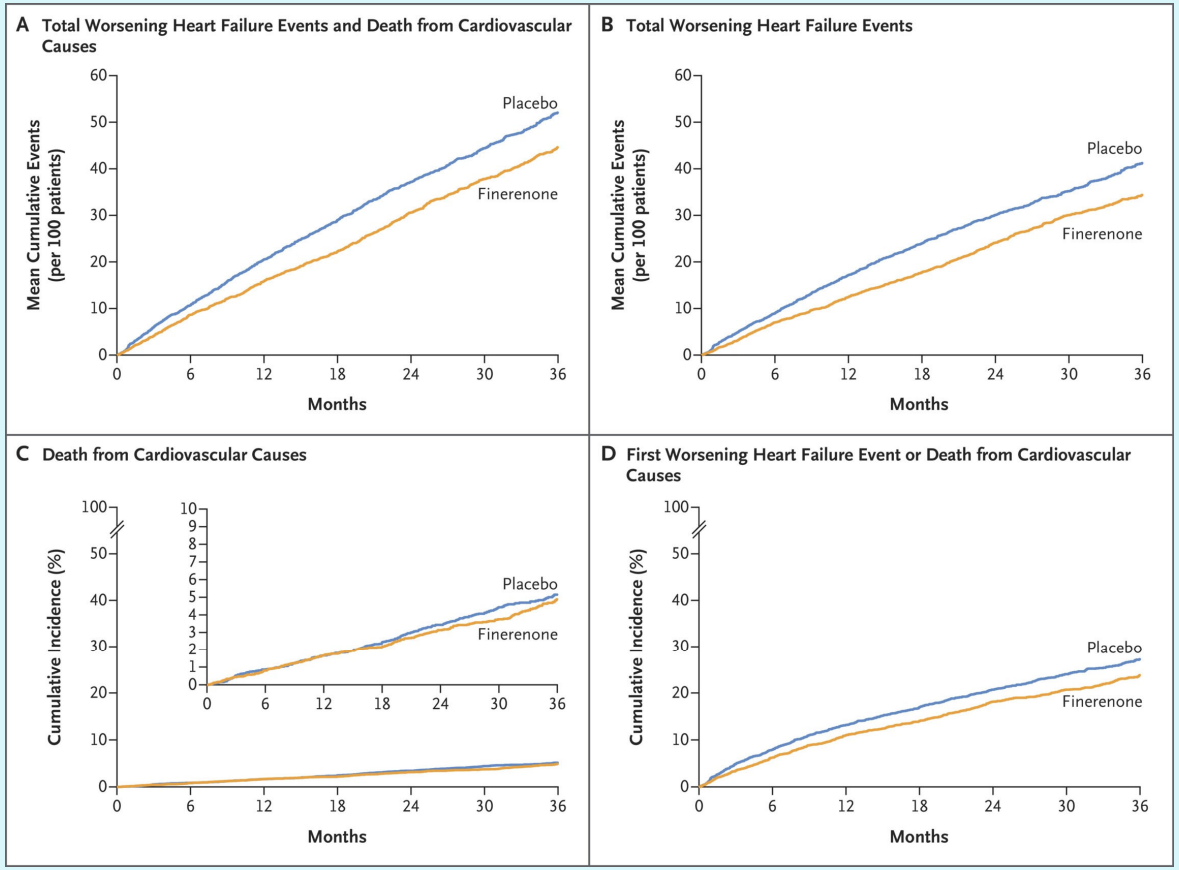
Faiez Zannad, M.D., Ph.D., John J.V. McMurray, M.D., Henry Krum, M.B., Ph.D., Dirk J. van Veldhuisen, M.D., Ph.D., Karl Swedberg, M.D., Ph.D., Harry Shi, M.S., John Vincent, M.B., Ph.D., Stuart J. Pocock, Ph.D., and Bertram Pitt, M.D., for the EMPHASIS-HF Study Group*



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 OCTOBER 24, 2024 VOL. 391 NO. 16

Finerenone in Heart Failure with Mildly Reduced or Preserved Ejection Fraction



Solomon SD et al. N Engl J Med2024;391:1475-1485

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Mineralocorticoid Receptor Antagonists

Drug	Initial Daily Dose(s)	Target Doses(s)	Mean Doses Achieved in Clinical Trials
Spironolactone	12.5–25 mg once daily	25–50 mg once daily	26 mg total daily
Eplerenone	25 mg once daily	50 mg once daily	42.6 mg total daily

SGLT2 Inhibitors

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.*

SGLT2 Inhibitors

Drug	Initial Daily Dose(s)	Target Doses(s)	Mean Doses Achieved in Clinical Trials
Dapagliflozin	10 mg once daily	10 mg once daily	9.8 mg total daily
Empagliflozin	10 mg once daily	10 mg once daily	NR

Hydralazine/Nitrates

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.**
2b	**In patients with current or previous symptomatic HFrEF who cannot be given first-line agents, such as ARNi, ACEi, or ARB, because of drug intolerance or renal insufficiency, a combination of hydralazine and isosorbide dinitrate might be considered to reduce morbidity and mortality.**

Drug	Guideline	HFrEF (EF ≤ 40%)	HFmrEF (EF 41-49%)	HFpEF (EF ≥ 50%)
ARNI	ESC 2021	I	IIb	
	ACC/AHA/HFSA 2022	I	IIb	IIb*†
BB	ESC 2021	I	IIb	
	ACC/AHA/HFSA 2022	I	IIb	
MRA	ESC 2021	I	IIb	
	ACC/AHA/HFSA 2022	I	IIb	IIb*
SGLT2i	ESC 2021	I		
	ACC/AHA/HFSA 2022	I	IIa	

Figure 2 Guideline recommendations for quadruple therapy across HF types. ACEi/ARB Class IIb for HFmrEF by both ESC and ACC/AHA/HFSA guidelines; ACC/AHA/HFSA also gives Class III (no benefit) recommendation for nitrates/PDE5i in HFpEF. *Greater benefit in patients with LVEF closer to 50%; †ARB (but not ACEi) given Class IIb recommendation for HFpEF in ACC/AHA/HFSA guidelines. References: McDonagh *et al. Eur Heart J* 2021,[10] Heidenreich *et al. Circulation* 2022.[11] ARNI, angiotensin receptor–neprilysin inhibitor; BB, beta-blocker; MRA, mineralocorticoid receptor antagonist; SGLT2i, sodium-glucose co-transporter 2 inhibitor; HFrEF, heart failure with reduced ejection fraction; HFmrEF, heart failure with mildly reduced ejection fraction; HFpEF, heart failure with preserved ejection fraction.

European Heart Journal Supplements, Volume 24, Issue Supplement_L, December 2022, Pages L10–L19, https://doi.org/10.1093/eurheartjsupp/suac113

ICD/CRT

1	**In patients at least 40 days post-MI with LVEF ≤35% and NYHA class II or III symptoms on chronic GDMT, who have reasonable expectation of meaningful survival for >1 year, ICD therapy is recommended for primary prevention of SCD to reduce total mortality.**
1	**In patients at least 40 days post-MI with LVEF ≤30%, who have reasonable expectation of meaningful survival for >1 year, ICD therapy is recommended for primary prevention of SCD to reduce total mortality.**
1	**For patients with LVEF ≤35%, left bundle branch block with a QRS ≥150 ms, NYHA class II, III, or ambulatory IV symptoms on GDMT, cardiac resynchronization therapy (CRT) is indicated to reduce mortality, reduce hospitalizations, and improve symptoms/QOL.**

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Digitoxin in Patients with Heart Failure and Reduced Ejection Fraction

U. Bavendiek,[1] A. Großhennig,[2] J. Schwab,[3,4] D. Berliner,[1] A. Rieth,[5] L.S. Maier,[6] T. Gaspar,[7,8] N.H. Thomas,[2] X. Liu,[2] S. Schallhorn,[1] E. Angelini,[1] S. Soltani,[1] F. Rathje,[1] M.-A. Sandu,[1] W. Geller,[1] R. Hambrecht,[9] M. Zdravkovic,[10] S. Philipp,[11] D. Kosevic,[12] G. Nickenig,[13] D. Scheiber,[14] S. Winkler,[15] P.M. Becher,[16-18] P. Lurz,[19] M. Hülsmann,[20] S. Wiesner,[2] C. Schröder,[21] B. Neuhaus,[22] A. Seltmann,[22] H. von der Leyen,[23,24] C. Veltmann,[1,25] S. Störk,[26,27] M. Böhm,[28] A. Koch,[2] and J. Bauersachs,[1] for the DIGIT-HF Study Group*

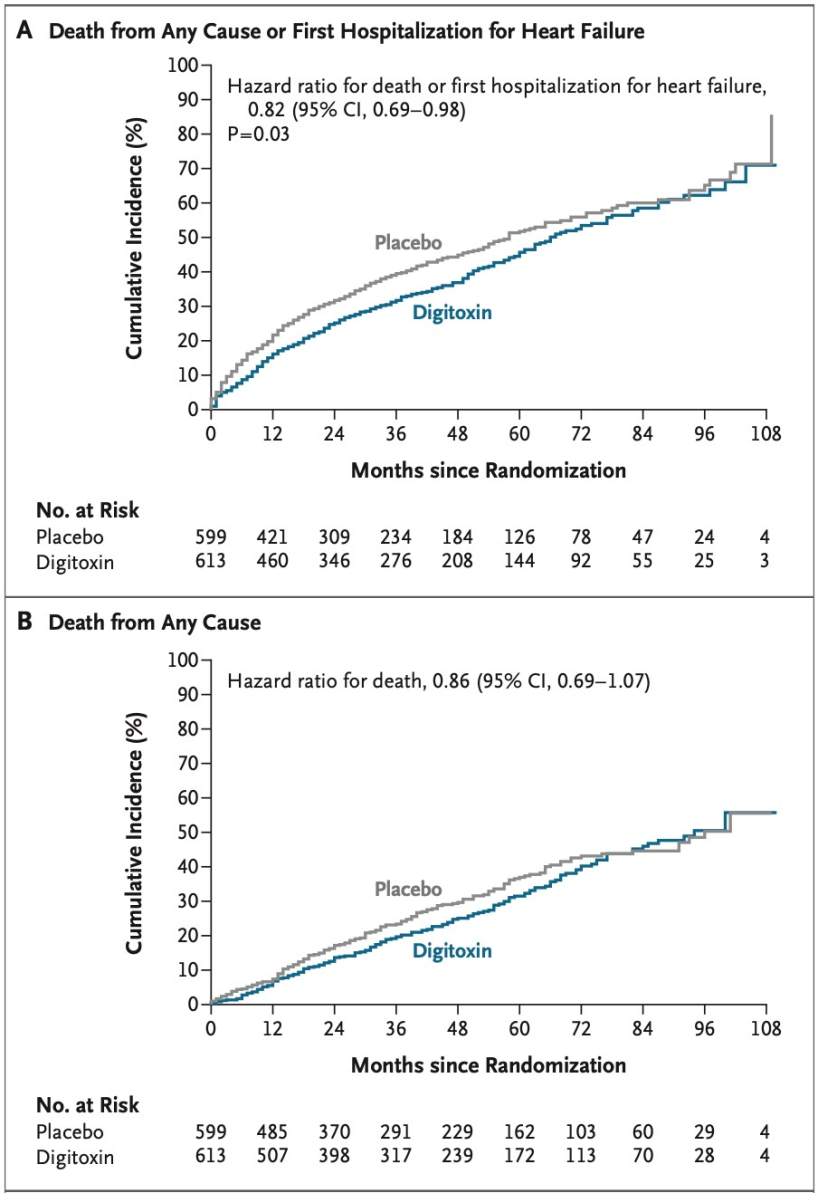
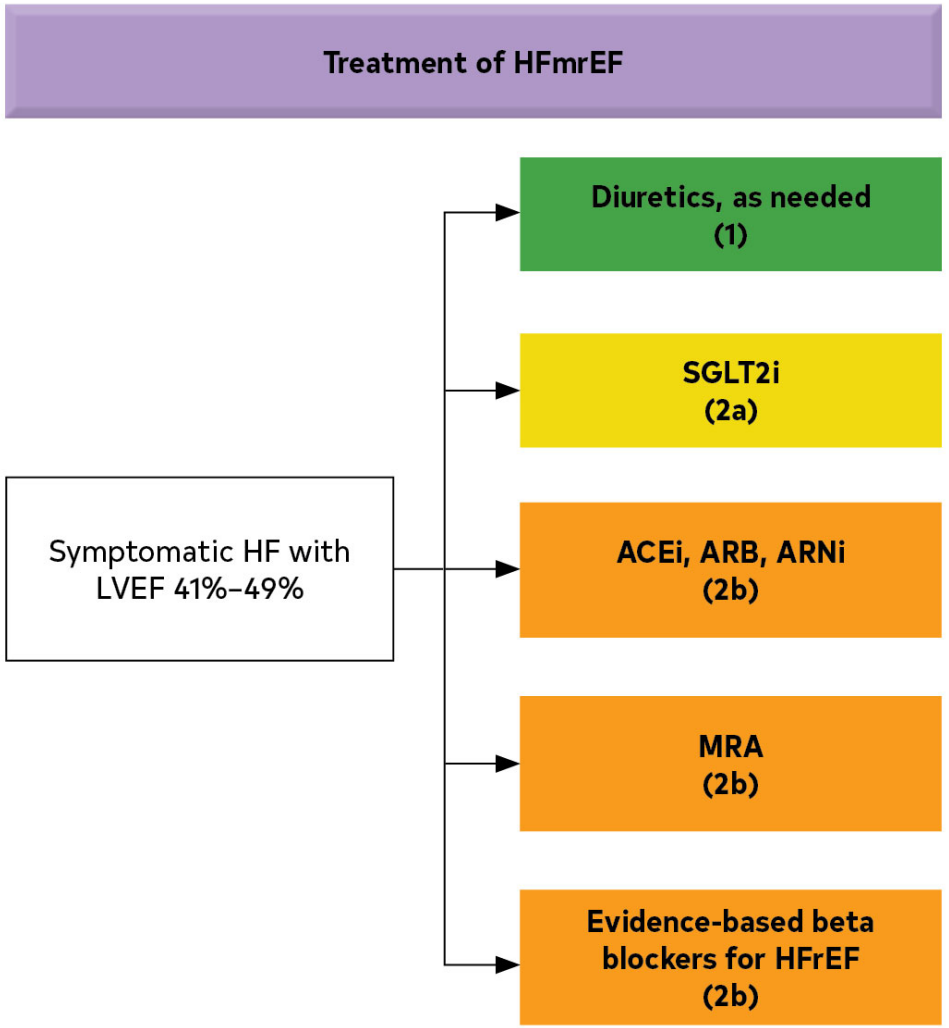


Table 2. Primary and Secondary Outcomes.

Outcome	Digitoxin (N = 613)		Placebo (N = 599)		Hazard or Rate Ratio (95% CI)*
	no. (%)†	*events/100 patient-yr*	*no. (%)†*	*events/100 patient-yr*	
Primary outcome and components					
Death from any cause or first hospitalization for heart failure	242 (39.5)	12.8	264 (44.1)	15.7	0.82 (0.69 to 0.98)‡
Death from any cause	167 (27.2)	7.8	177 (29.5)	8.9	0.86 (0.69 to 1.07)§
First hospitalization for heart failure¶	172 (28.1)	9.1	182 (30.4)	10.8	0.85 (0.69 to 1.05)
Key secondary outcome					
Death from any cause and hospitalization for heart failure	537	25.1	531	26.6	0.85 (0.67 to 1.09)‖
Other secondary outcomes					
Death from cardiovascular causes	125 (20.4)	5.8	132 (22.0)	6.6	0.87 (0.67 to 1.11)
Death from heart failure	46 (7.5)	2.2	47 (7.8)	2.4	0.86 (0.57 to 1.31)
Sudden death from cardiac causes	12 (2.0)	0.6	12 (2.0)	0.6	0.89 (0.40 to 2.00)
Death from noncardiovascular causes	42 (6.9)	2.0	45 (7.5)	2.3	0.84 (0.55 to 1.29)
Hospitalization for cardiovascular causes¶	359 (58.6)	28.8	353 (58.9)	32.8	0.89 (0.77 to 1.04)
Hospitalization for noncardiovascular causes¶	263 (42.9)	18.1	255 (42.6)	18.6	0.97 (0.81 to 1.15)
Any hospitalization¶	429 (70.0)	43.9	427 (71.3)	50.4	0.90 (0.78 to 1.03)
Death from cardiovascular causes or first hospitalization for worsening heart failure	220 (35.9)	11.7	232 (38.7)	13.8	0.85 (0.71 to 1.03)

Recommendations for Patients With Mildly Reduced LVEF (41%–49%)



American Heart Association.

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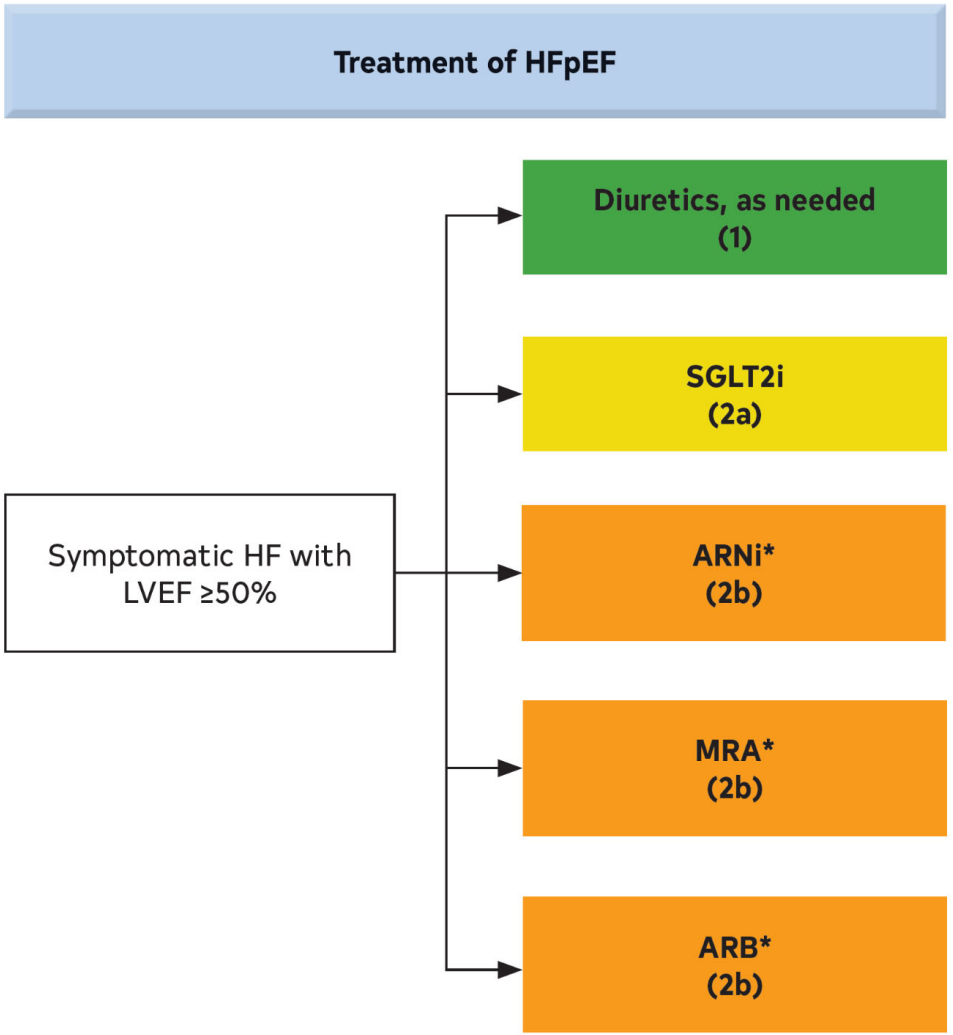
Recommendations for Patients With Preserved LVEF (≥50%)



American Heart Association.

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HF with Improved Ejection Fraction

1

For patients with HFimpEF after treatment, GDMT should be continued to prevent relapse of HF and LV dysfunction, even in patients who may become asymptomatic.

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Cumulative Impact of Evidence-Based HF with Reduced EF Medical Therapies

	Relative Risk	2yr Mortality
None	--	35%
ACEI or ARB	↓ 23%	27%
Beta Blocker	↓ 35%	18%
Aldosterone Ant	↓ 30%	13%
ARNI (replacing ACEI/ARB)	↓ 16%	10.9%
SGLT2 inhibitor	↓ 17%	9.1%

Cumulative risk reduction if all evidence-based medical therapies are used:
Relative risk reduction 74%, Absolute risk reduction: 25.9%, NNT = 3.9

Updated from Fonarow GC, et al. Am Heart J 2011;161:1024-1030 and Lancet 2008;372:1195-1196.

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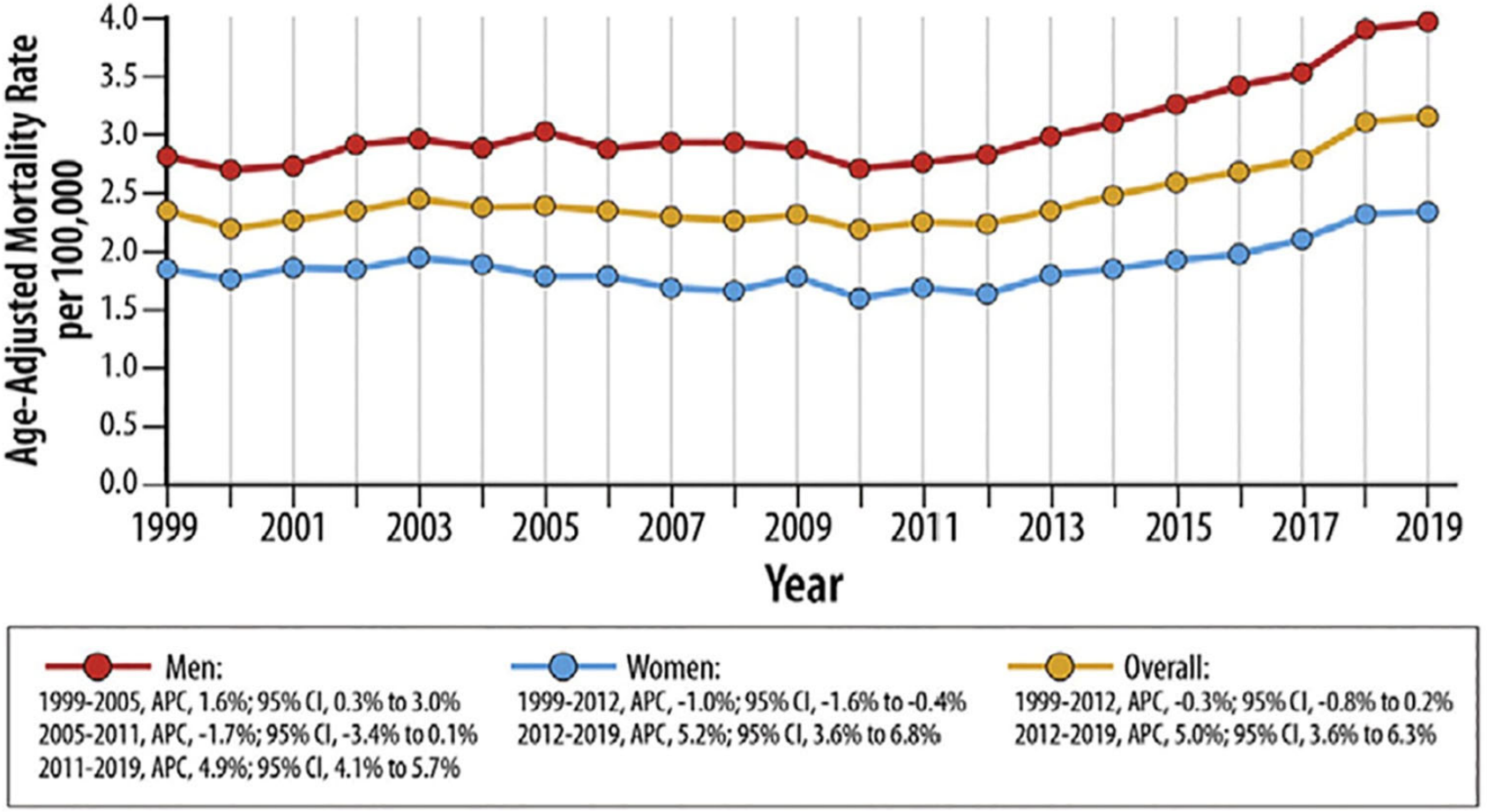


J Card Fail. 2023 Oct; 29(10): 1412–1451.
doi: 10.1016/j.cardfail.2023.07.006

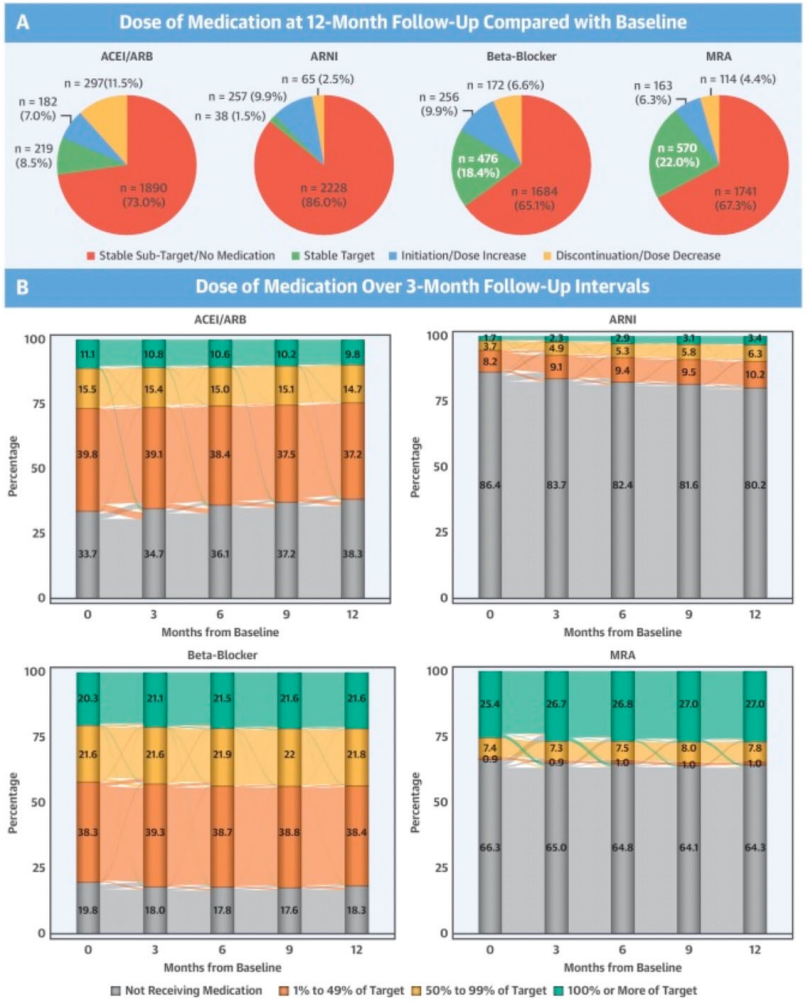
Medical Therapy for Heart Failure With Reduced Ejection Fraction

The CHAMP-HF Registry

	ACEI/ARB	ARNI	ACEI/ARB/ ARNI	Beta-Blocker	MRA
Without Contraindication and Not Treated	1374	3029	920	1159	2317
Treated	2107	452	2536	2351	1163
With Contraindication	37	37	62	8	38

Greene, S.J. et al. J Am Coll Cardiol. 2018;72(4):351-66.

CENTRAL ILLUSTRATION: Changes in Use and Dose of GDMT Over 12 Months Among Patients With Chronic Heart Failure With Reduced Ejection Fraction in Contemporary U.S. Outpatient Practice

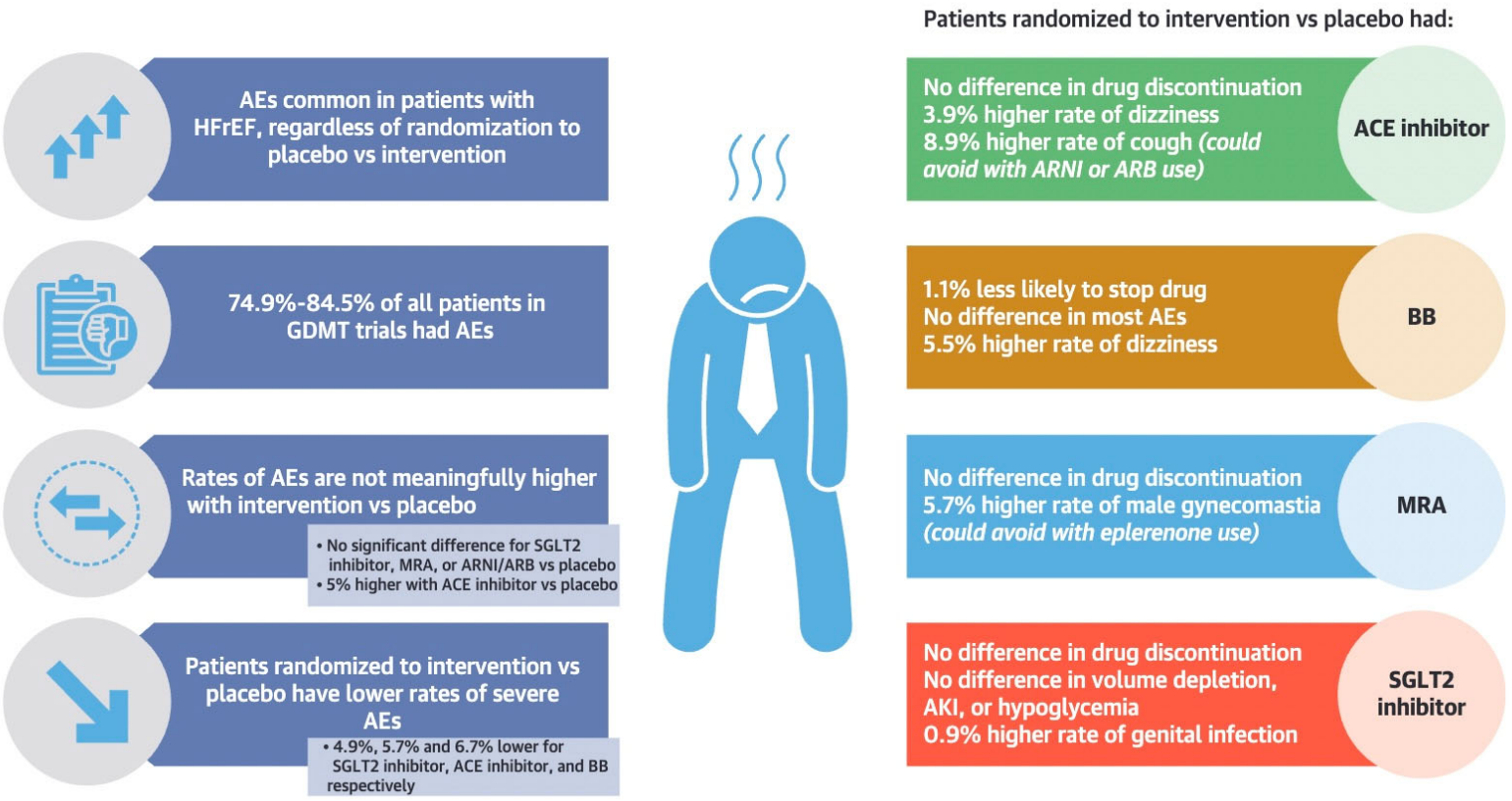


Greene, S.J. et al. J Am Coll Cardiol. 2019;73(19):2365-83.

Reasons For Underutilization Of Proven Therapies for HF

- Knowledge gaps
- Misinterpretation of patient risk or clinical stability
- Concerns about blood pressure/tolerability/side effects
- **Therapeutic inertia**
- Bias (age, race, sex, socioeconomic status)
- Concerns about access, cost, cost effectiveness, value

CENTRAL ILLUSTRATION Medication-Attributable AEs in Heart Failure Trials

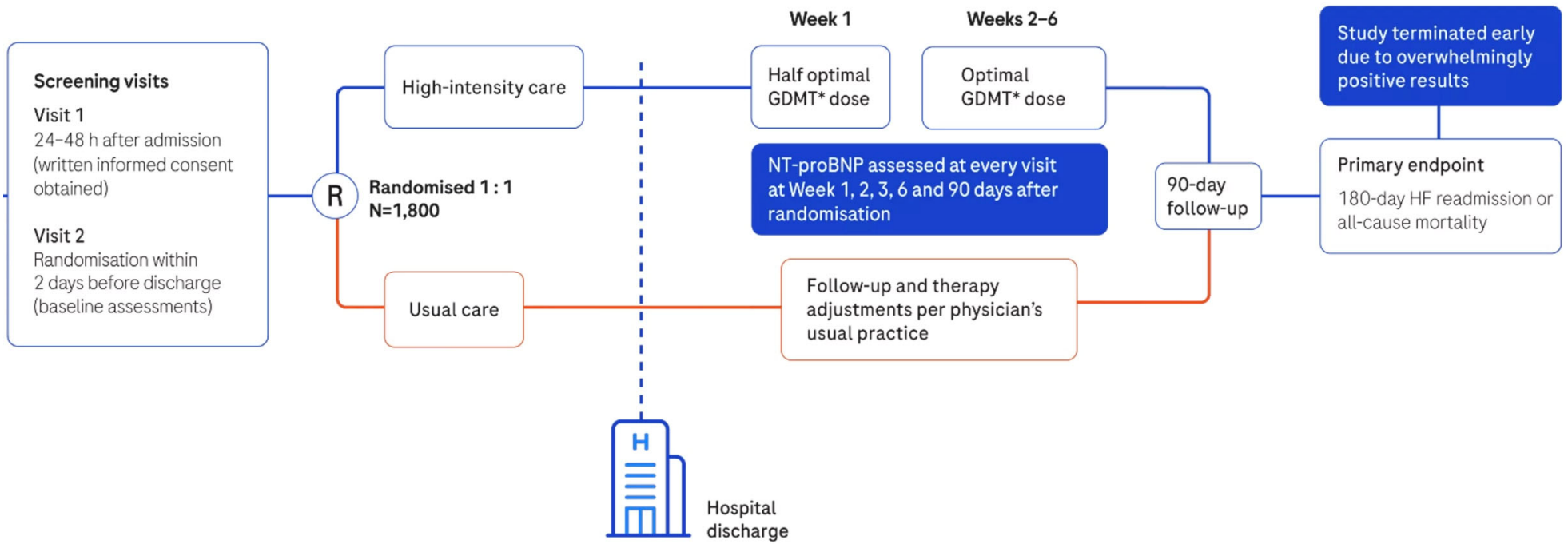


Harrington J, et al. J Am Coll Cardiol HF. 2023;11(4):425-436.

ACE = angiotensin-converting enzyme; AE = adverse event; AKI = acute kidney injury; ARB = angiotensin II receptor blocker; ARNI = angiotensin receptorneprilysin inhibitor; BB = beta-blocker; GDMT = guideline-directed medical therapy; HFrEF = heart failure with reduced ejection fraction; MRA = mineralocorticoid receptor antagonist; SGLT2 = sodium-glucose cotransporter 2.

STRONG-HF

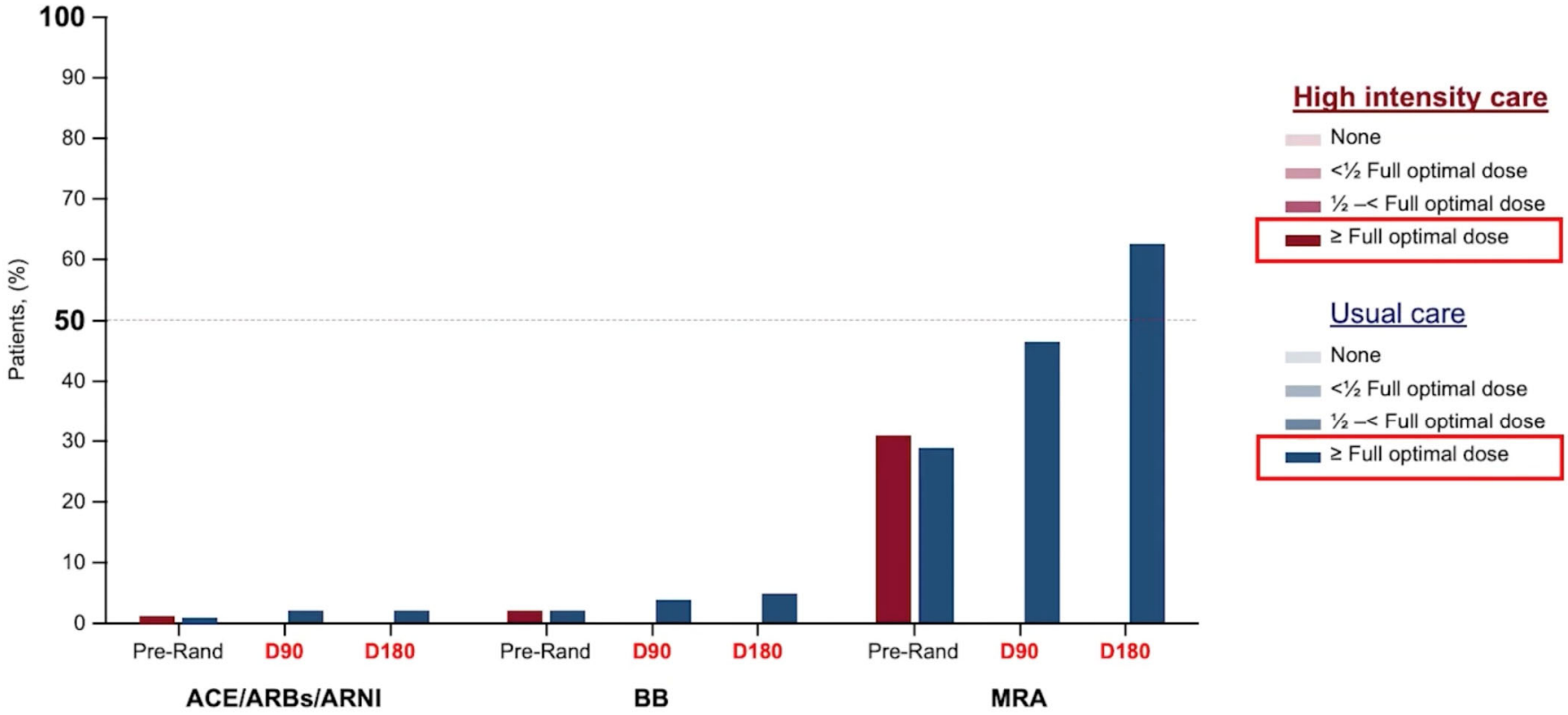
CONTEMPORARY POST-DISCHARGE MANAGEMENT IN HEART-FAILURE



STRONG-HF
CONTEMPORARY POST-DISCHARGE MANAGEMENT IN HEART-FAILURE

Oral GDMT prescribed in high intensity and usual care

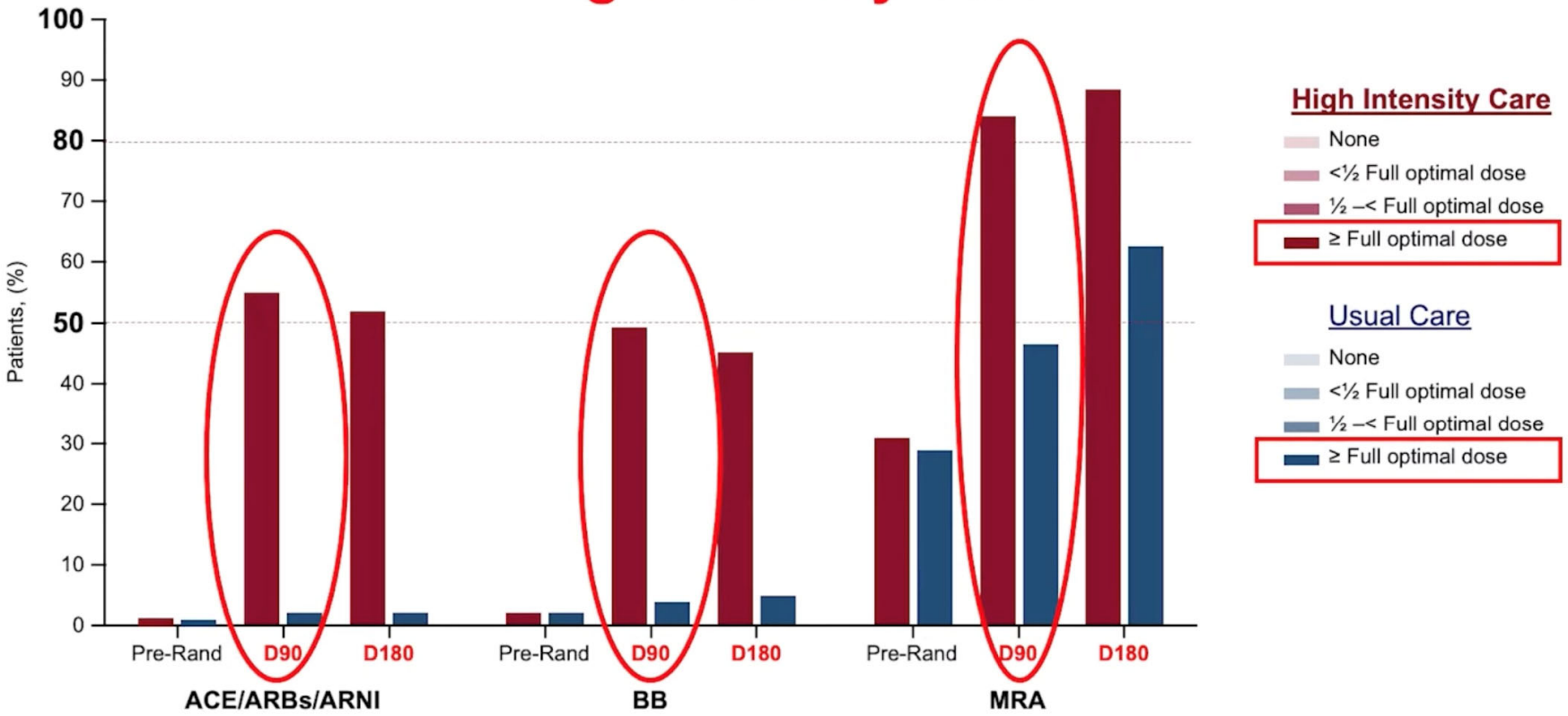
Usual Care



STRONG-HF
CONTEMPORARY POST-DISCHARGE MANAGEMENT IN HEART-FAILURE

Oral GDMT prescribed in high intensity and usual care

High Intensity Care



Safety, tolerability and efficacy of up-titration of guideline-directed medical therapies for acute heart failure in elderly patients: A sub-analysis of the STRONG-HF randomized clinical trial

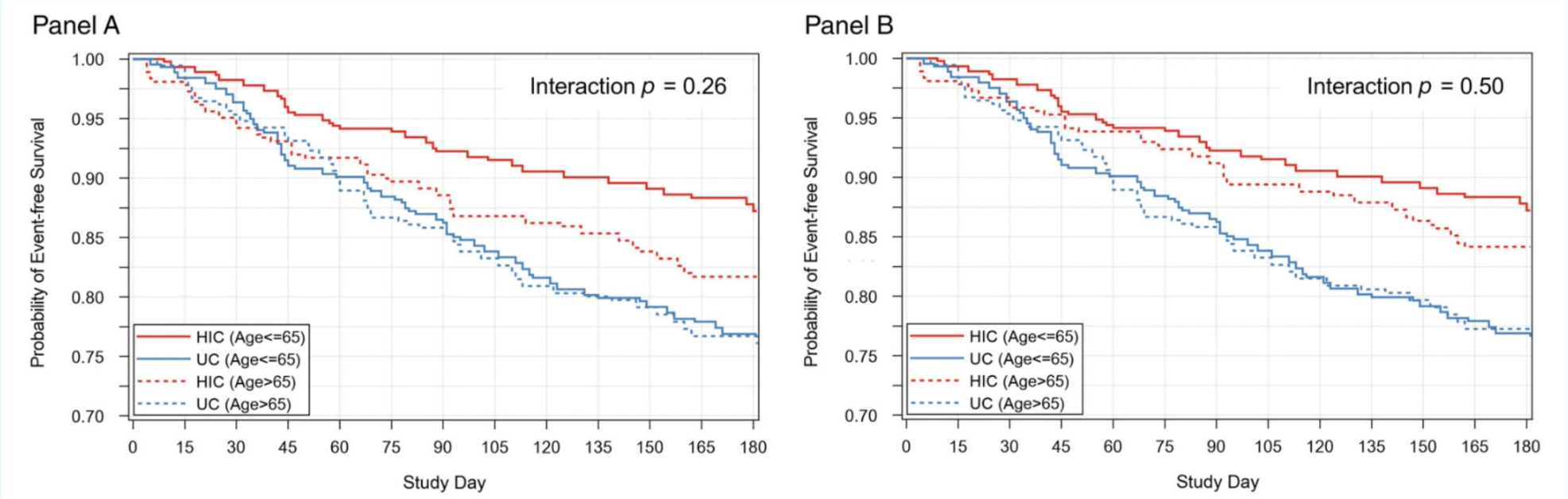
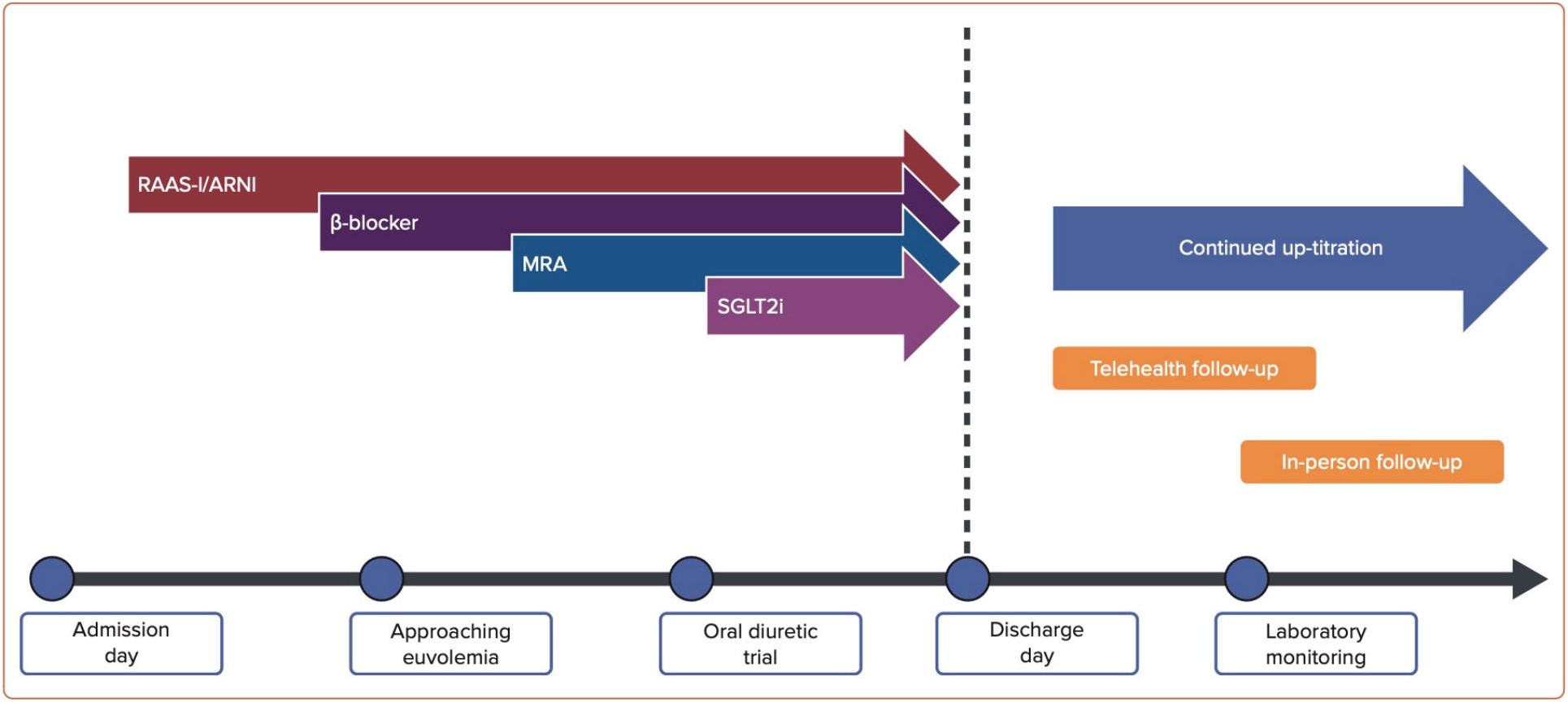


Figure 2 Unadjusted Kaplan–Meier curves for the primary endpoint (all-cause death or heart failure readmission) through day 180 by age category (≤65/>65 years) and treatment. (*A*) Results including all deaths as events. (*B*) Results after exclusion of COVID-19 deaths as events. HIC, high-intensity care; UC, usual care.

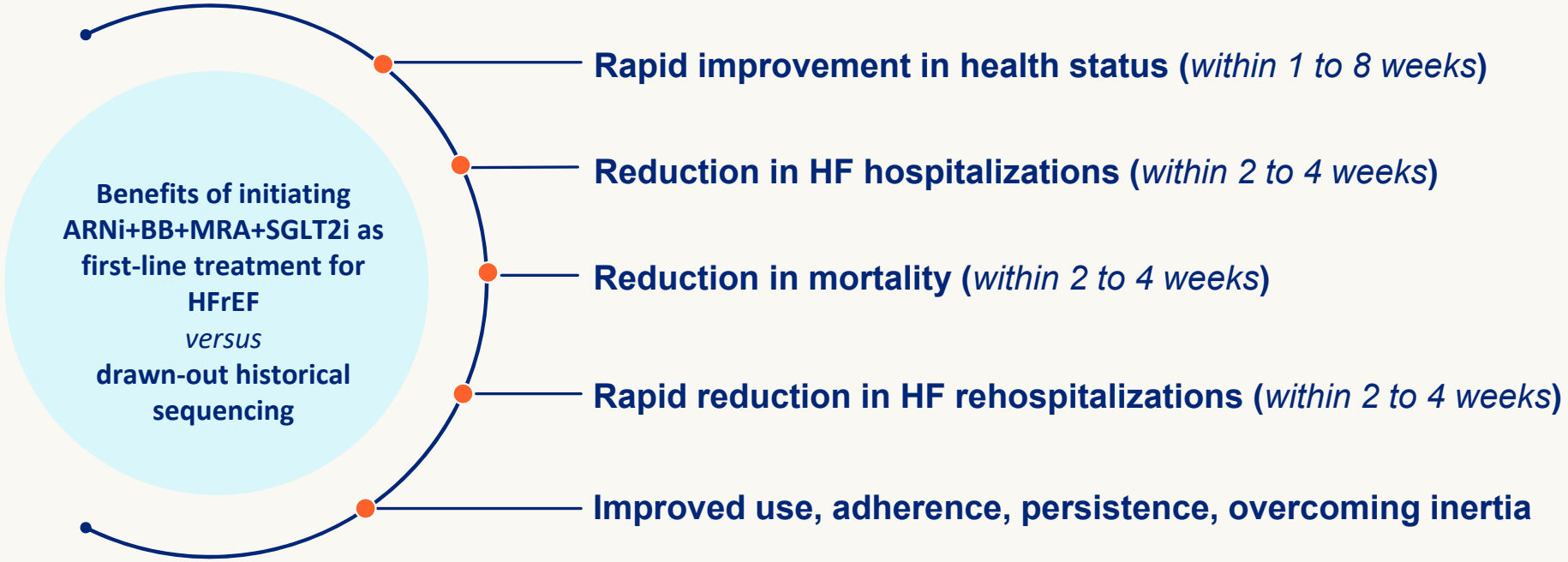
Figure 1: Shifting the Paradigm of Guideline-directed Medical Therapy Initiation



A suggested timeline of initiating guideline-directed medical therapy (GDMT) for patients admitted with heart failure with reduced ejection fraction during their hospitalization. ACEi = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; ARNI = angiotensin receptor–neprilysin inhibitor; MRA = mineralocorticoid receptor antagonist; RAAS-I = renin-angiotensin-aldosterone system inhibitor; SGLT2i = sodium–glucose cotransporter-2 inhibitor.

US Cardiology Review 2021;15:e07. **DOI:** https://doi.org/10.15420/usc.2020.29

Benefits of Simultaneous or Rapid Initiation of GDMT



(Khariton Y, 2019; Desai AS, 2019; Bhatt AS, 2020; Morrow DA, 2019; Greene SJ, 2021)

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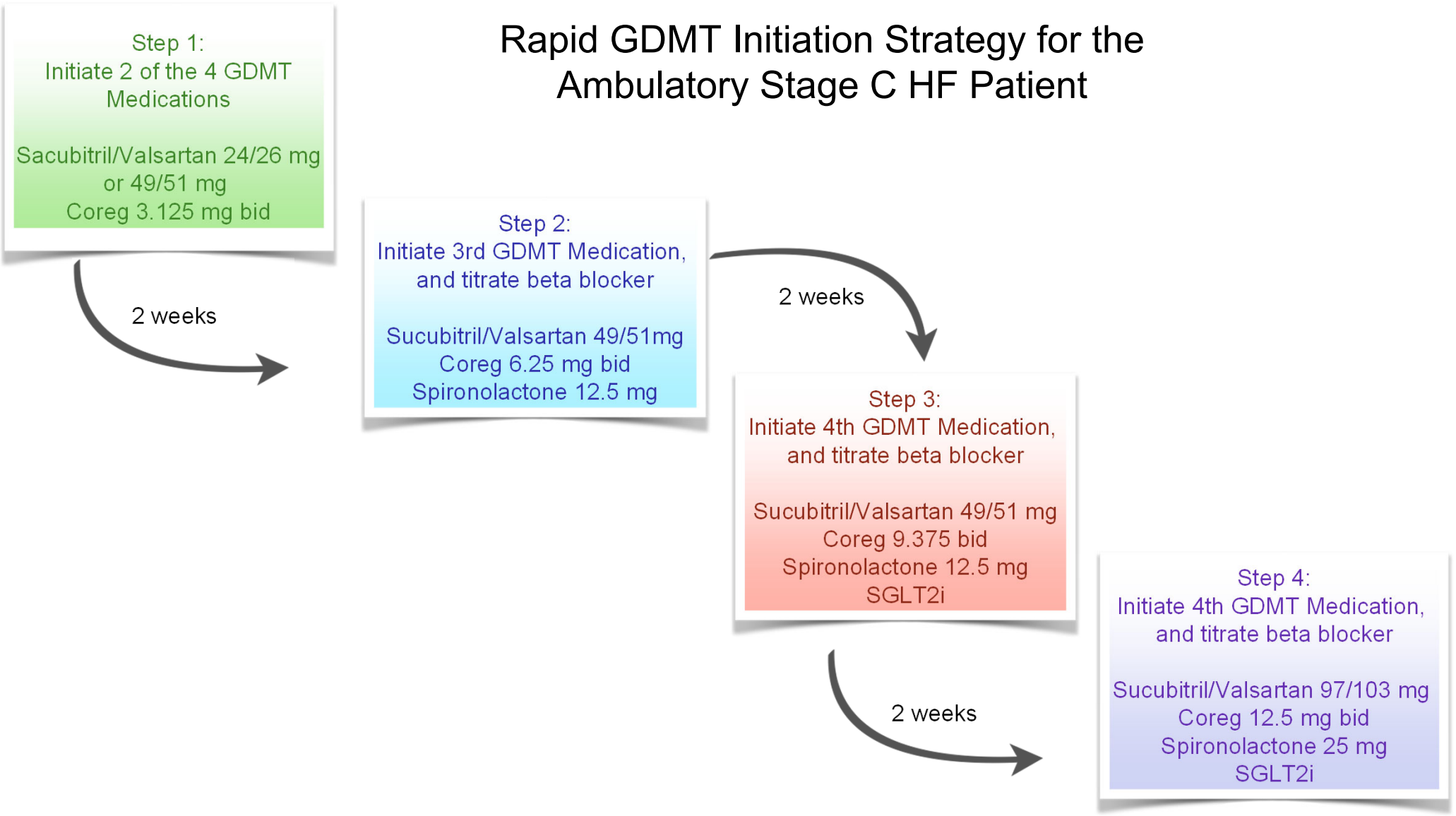
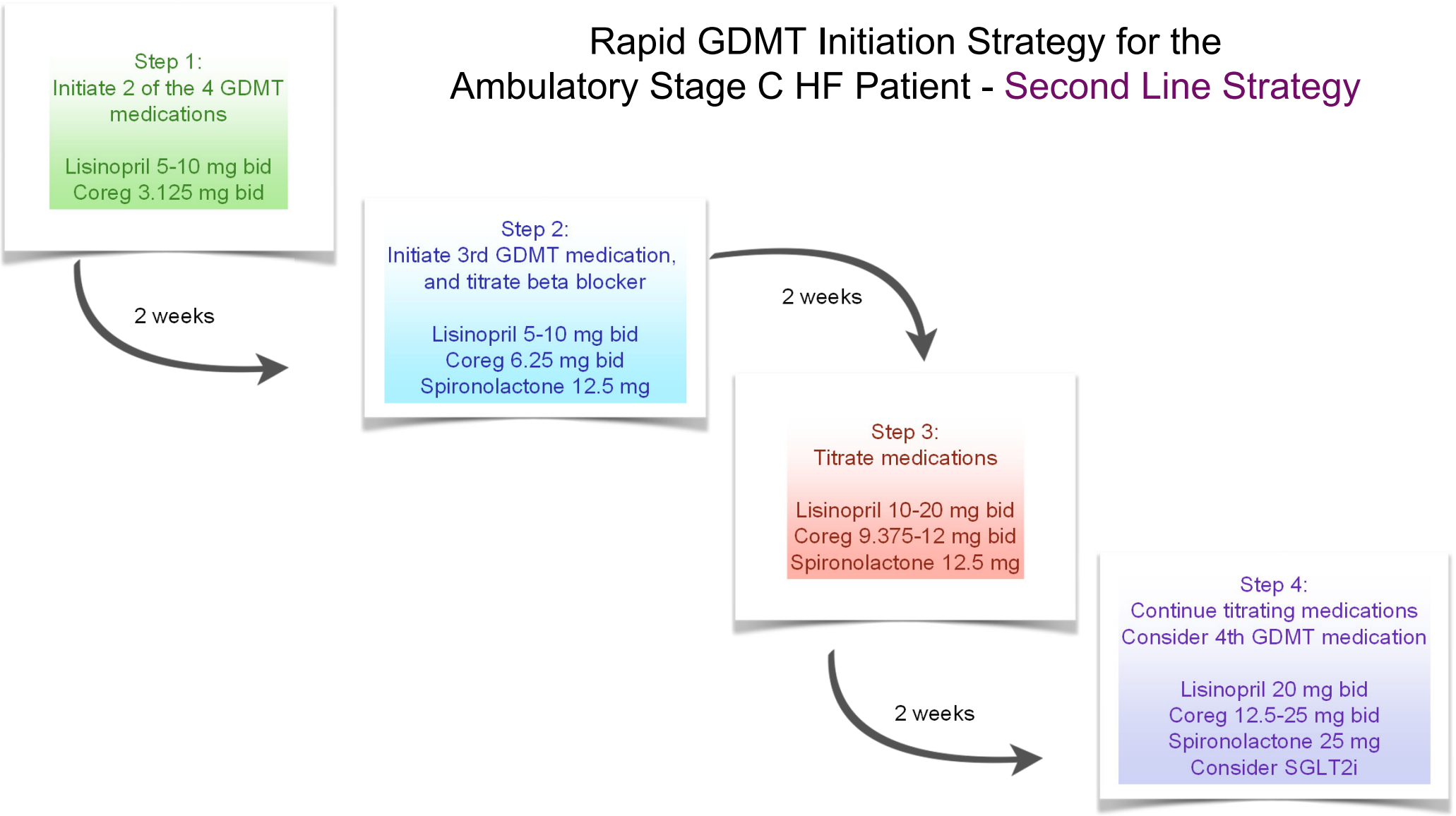
Rapid GDMT Initiation Strategy for the Ambulatory Stage C HF Patient



Rapid GDMT Initiation Strategy for the Ambulatory Stage C HF Patient - Second Line Strategy



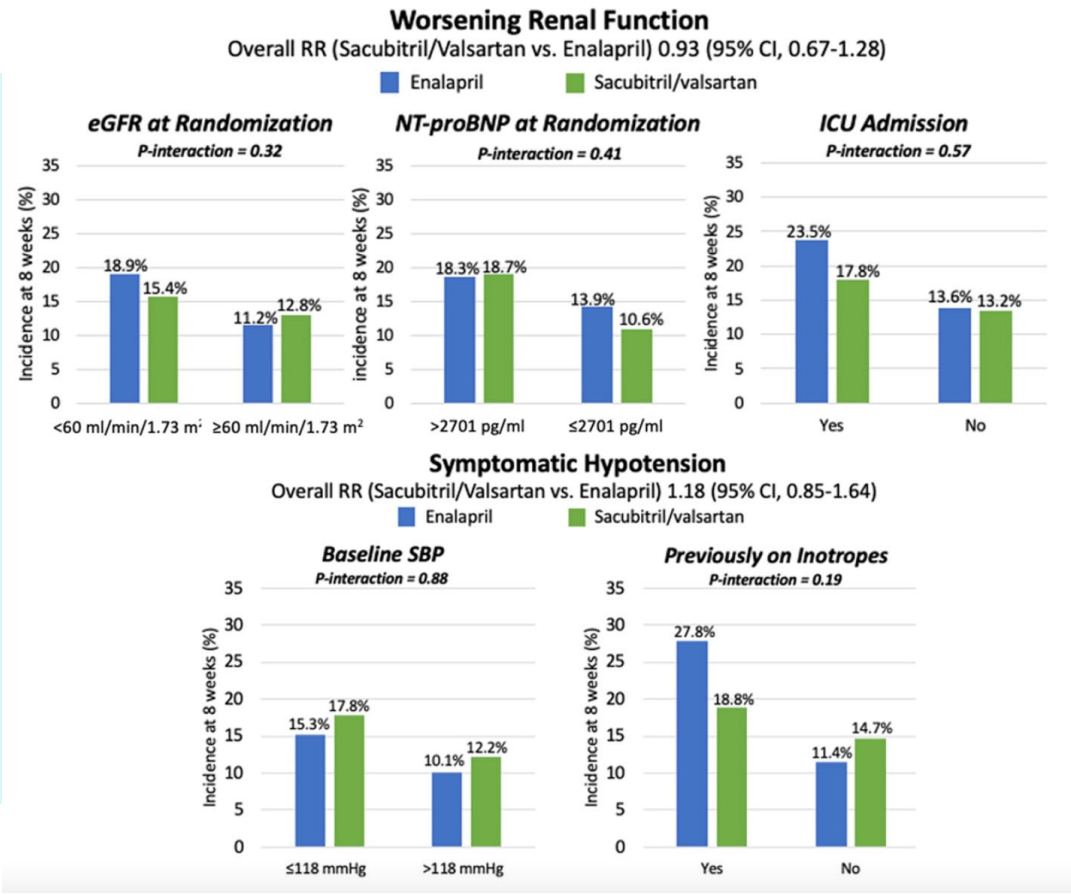
Overcoming Common Clinical Barriers to Guideline-directed Medical Therapies Optimization

Barrier to Optimization	First-line Strategy	Second-line Strategy
Acute kidney injury	• Reduce dose or hold RAAS-I/ARNI. Retrial once renal function improves • Reduce diuretic dose to the lowest dose required to maintain euvolemia	• Switch RAAS-I/ARNI to combination of hydralazine/nitrate only after multiple failed trials
Hyperkalemia	• Remove potassium supplementation • Consider addition of potassium-binders and low potassium diet • Add SGLT2i • Retrial with ARNI (instead of ACEi or ARB)	• Reduce or hold doses of RAAS-I/ARNI or MRA. Retrial one at a time • Switch RAAS-I/ARNI to combination of hydralazine/nitrate only after multiple failed trials
Symptomatic hypotension	• Reduce or remove medications that lower BP and are not guideline recommended • Stagger doses of GDMT that lower BP (e.g. morning and evening doses) • Reduce GDMT dose based on symptoms of hypotension, not blood pressure parameters alone • Reduce diuretic dose to the lowest dose to required maintain euvolemia	• Prioritize β-blocker dosage • Switch carvedilol to metoprolol succinate • Reduce dosage of RAAS-I/ARNI • Switch ARNI to ACEi/ARB and retrial with ARNI in future • Reduce SGLT2i dose and retrial at regular dose in future
Adherence	• Medication reminders (e.g. pillboxes, smartphone apps, medication logs). Use once daily medications	• Post-discharge telehealth. • Refer to HF-specific medication titration clinics
Cost/insurance	• Submit prior authorization requests early in hospitalization • Assess patient willingness and ability to pay and prescribe more affordable medications, if necessary	• Periodically reassess availability of new/higher cost medications • Perform institution specific cost-effectiveness analysis

ACEi = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; ARNI = angiotensin receptor–neprilysin inhibitor; BP = blood pressure; GMDT = guideline-directed medical therapy; HF = heart failure; MRA = mineralocorticoid receptor antagonist; RAAS-I = renin-angiotensin-aldosterone system inhibitor; SBP = systolic blood pressure; SGLT2i = sodium glucose cotransporter-2 inhibitor.

US Cardiology Review 2021;15:e07. **DOI:** https://doi.org/10.15420/usc.2020.29

HF Treatment Inertia



Circ Heart Fail. 2021 Feb 3;14(2):e007034. doi: 10.1161/CIRCHEARTFAILURE.120.007034

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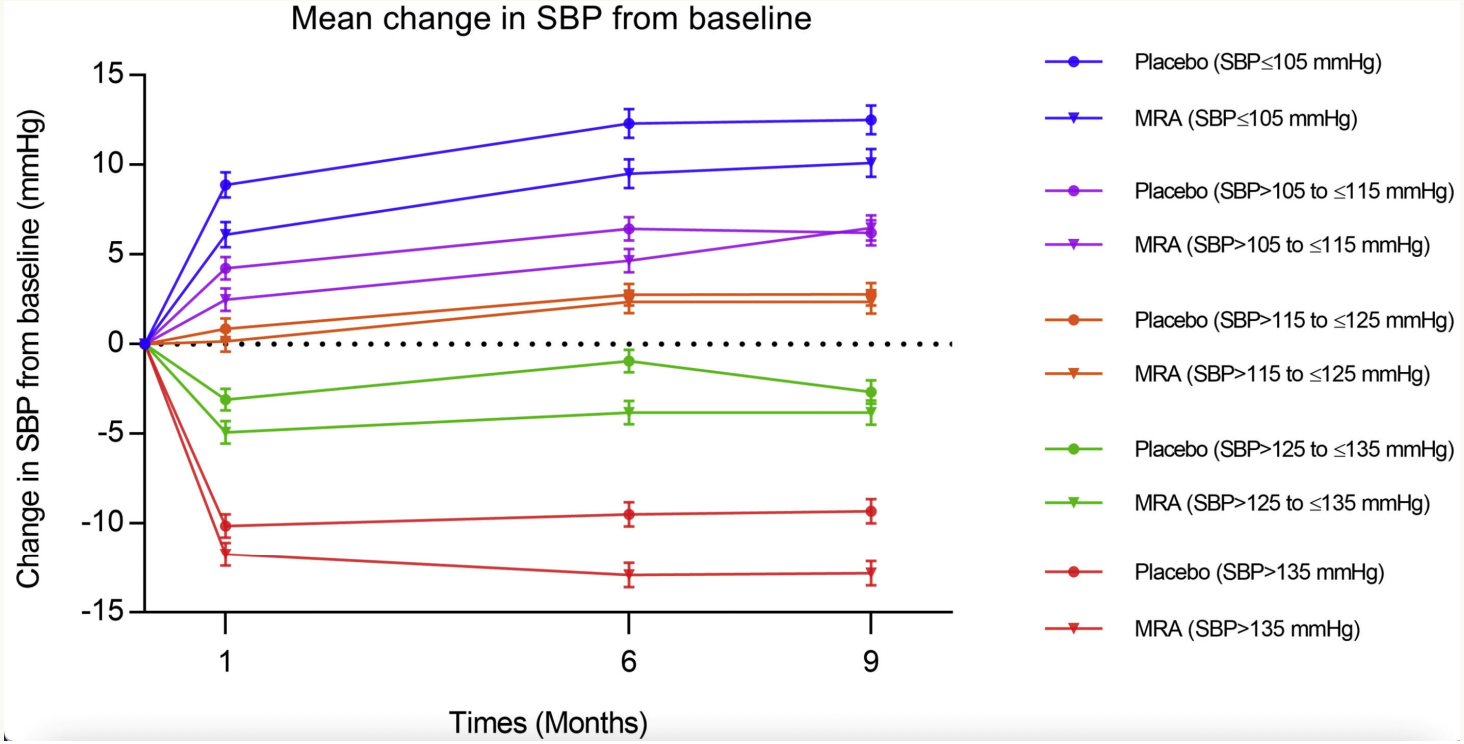
Mineralocorticoid Receptor Antagonists, Blood Pressure, and Outcomes in Heart Failure with Reduced Ejection Fraction



Serenelli, M. et al. J Am Coll Cardiol HF. 2020;8(3):188-98.

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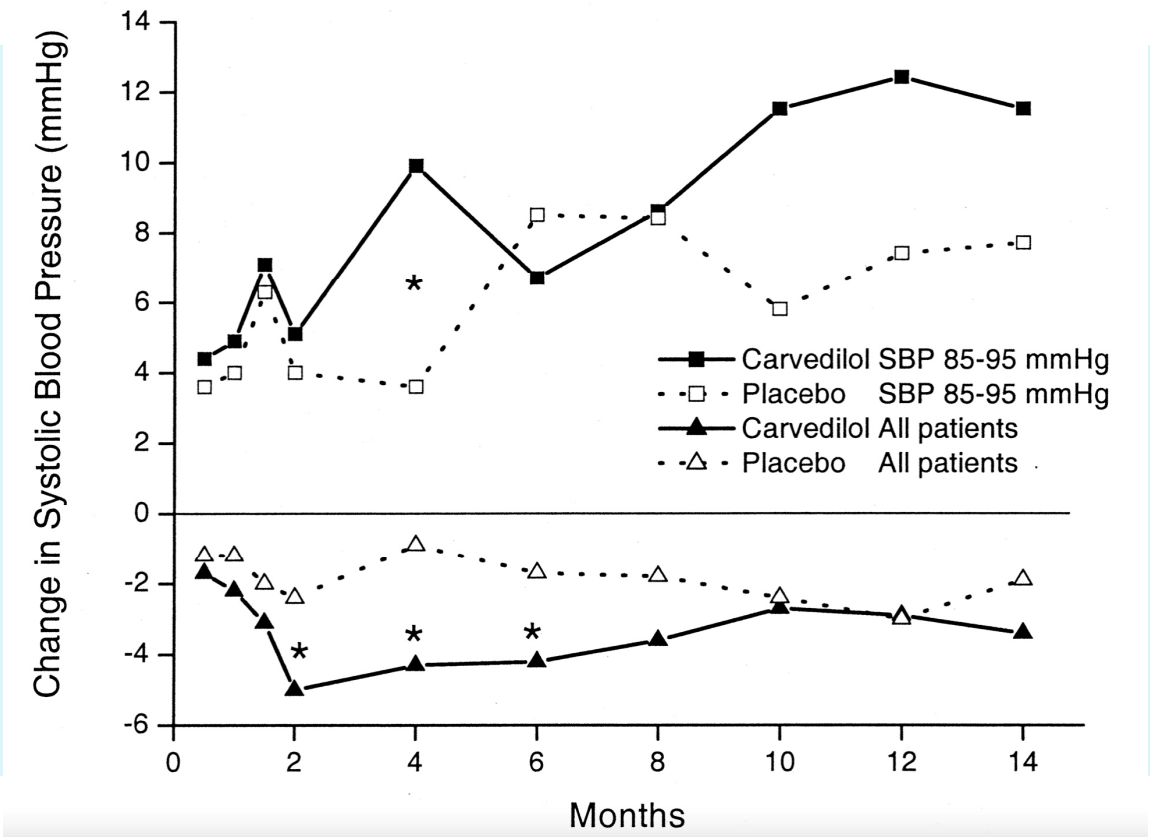
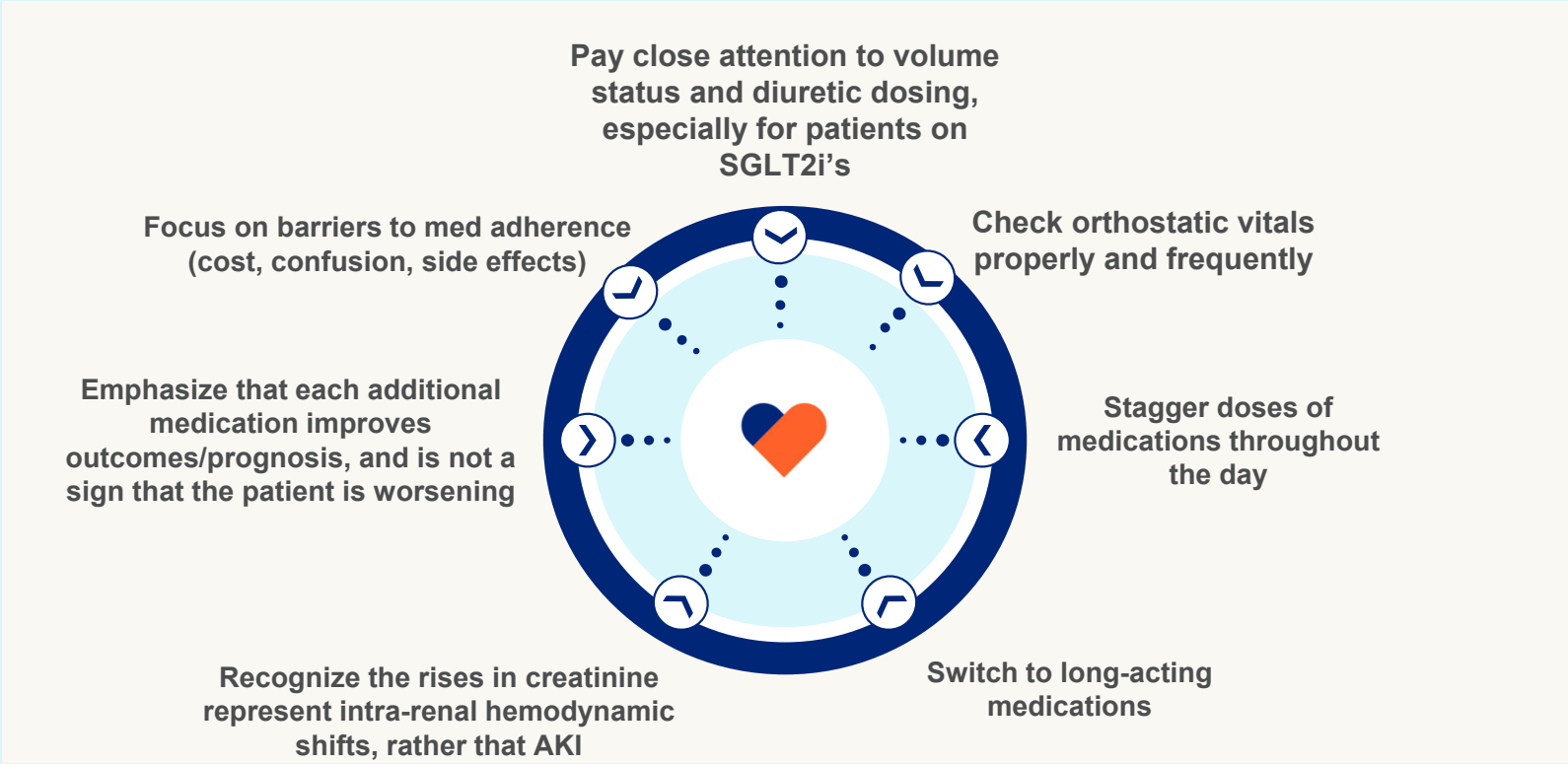
Influence of Pretreatment Systolic Blood Pressure on the Effect of Carvedilol in Patient with Sever Chronic Heart Failure



https://doi.org/10.1016/j.jacc.2003.11.037

The Carvedilol Prospective Randomized Cumulative Survival (COPERNICUS) Study

Tips for Optimal Titration of GDMT



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Screening for Heart Failure

Current guidelines recommend considering screening for heart failure for all patients considered at risk.

We recommend screening the following patients:
Patients aged 60 and older, seen in an ambulatory setting, with one of the following risk factors:

1. Type 1 or Type 2 diabetes
2. Hypertension
3. Chronic kidney disease, stage 3 or higher
4. Obesity (BMI ≥30)
5. History of myocardial infarction
6. Atrial fibrillation

Acceptable assessment tools

Brain Natriuretic Peptide (BNP) or N-Terminal pro-B-type natriuretic peptide (NT-proBNP)

Recommended assessment tools

Symptom questionnaire followed by BNP or NT-proBNP level in patients with at least one symptom identified

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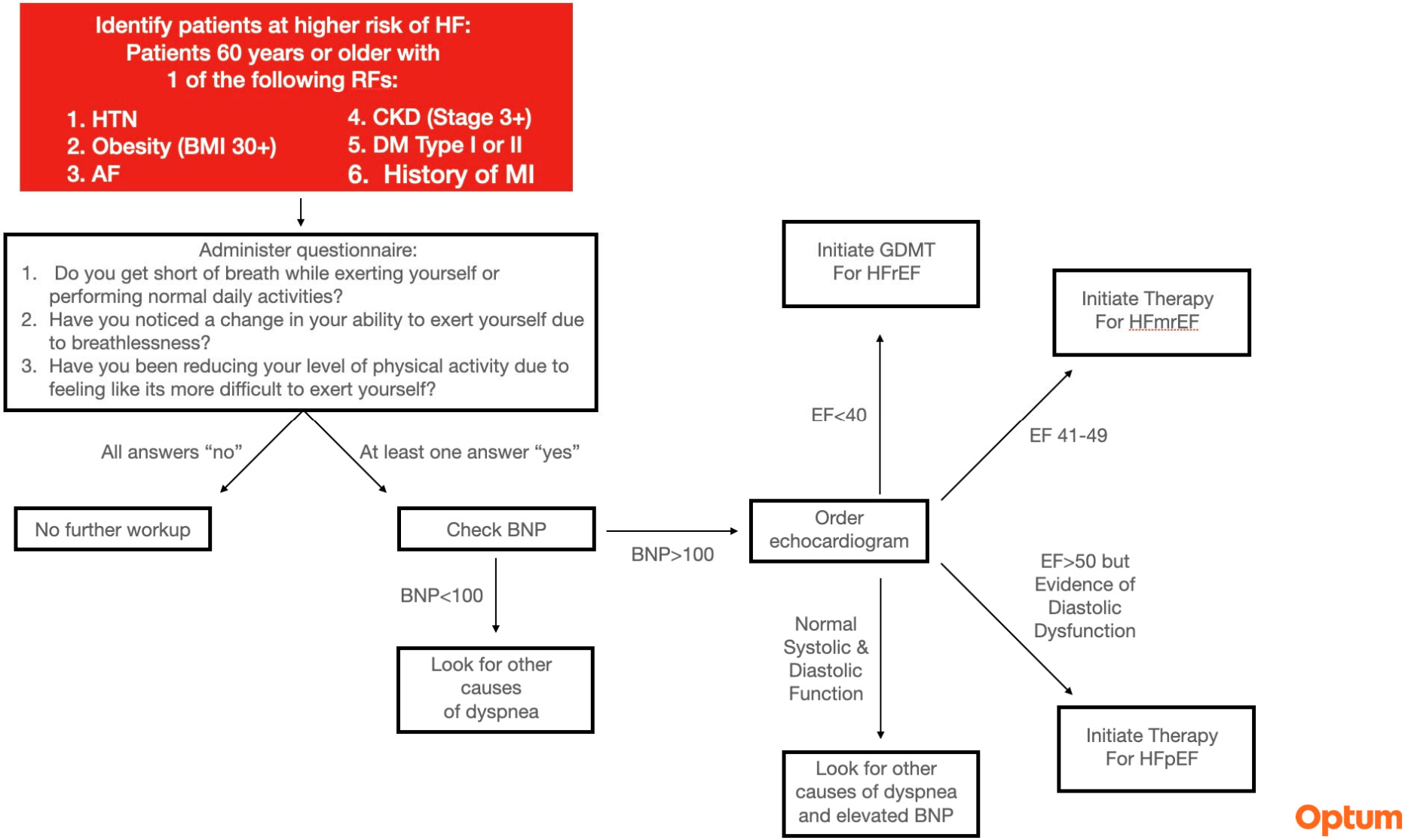
Identify patients at higher risk of HF:
Patients 60 years or older with
1 of the following RFs:
1. HTN
2. Obesity (BMI 30+)
3. AF
4. CKD (Stage 3+)
5. DM Type I or II
6. History of MI
Administer questionnaire:
1. Do you get short of breath while exerting yourself or performing normal daily activities?
2. Have you noticed a change in your ability to exert yourself due to breathlessness?
3. Have you been reducing your level of physical activity due to feeling like its more difficult to exert yourself?
All answers "no"
At least one answer "yes"
No further workup
Check BNP
BNP<100
Look for other causes of dyspnea
BNP>100
Order echocardiogram
EF<40
Initiate GDMT For HFrEF
EF 41-49
Initiate Therapy For HFmrEF
EF>50 but Evidence of Diastolic Dysfunction
Initiate Therapy For HFpEF
Normal Systolic & Diastolic Function
Look for other causes of dyspnea and elevated BNP

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Causes of an Elevated BNP

Cardiac
HF, including RV HF syndromes
ACS
Heart muscle disease, including LVH
VHD
Pericardial disease
AF
Myocarditis
Cardiac surgery
Cardioversion
Toxic-metabolic myocardial insults, including cancer chemotherapy

Noncardiac
Advancing age
Anemia
Renal failure
Pulmonary: Obstructive sleep apnea, severe pneumonia
Pulmonary embolism, pulmonary arterial hypertension
Critical illness
Bacterial sepsis
Severe burns

Take Home Messages…

1. Guideline-directed medical therapy (GDMT) for heart failure (HF) with reduced ejection fraction (HFrEF) now includes 4 medication classes which include sodium-glucose cotransporter-2 inhibitors (SGLT2i).

2. SGLT2 inhibitors have a 2a recommendation in heart failure with mildly reduced ejection fraction (HFmrEF). Weaker recommendations (2b) are made for ARNi, ACEi, ARB, MRA and beta blockers in this population.

3. Improved LVEF is used to refer to those patients with a previous HFrEF who now have an LVEF > 40%. These patients should continue their HFrEF treatment.

4. Primary prevention is important for those at risk for HF (Stage A) or pre-HF (Stage B). Stages of HF were revised to emphasize the new terminologies of “at risk” for HF for Stage A and Pre-HF for Stage B.

4. Early, rapid initiation of the four pillars of GDMT, often simultaneous or in rapid sequence, leads to early reductions in HF hospitalizations and CV mortality in as early as 30 days.

ARNI/ACEI/ARB

Beta Blocker

MRA

SGLT2i

Questions?

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