THE COLORADO SOCIETY FOR POST-ACUTE AND LONG-TERM CARE MEDICINE

Heart Failure in Post-Acute Care Patients: A Practical Approach

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Tufts Medical Center

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Objectives

- Overview of heart failure in PAC patients
- Discuss the differential and assessment of dyspnea among patients in post acute or long-term care.
- Highlight select recent relevant updates to the management of HFrEF and HFpEF as they relate to patients in PAC
- Introduce practical strategies for treating medically complex heart failure patients

PACC - Background

- Independent cardiac consulting practice for SNFs with expressed focus on improving care for high risk cardiac patients and developing CHF programs
- Source of referrals: MDs, APRNs, rehabilitation staff, unit supervisors, DON, admissions, discharging hospitalists, hospital case management/social work
- Weekly bedside medical rounds
- Program development, In-servicing staff
- Facility Level and Corporate consultation, Hospital SNF network

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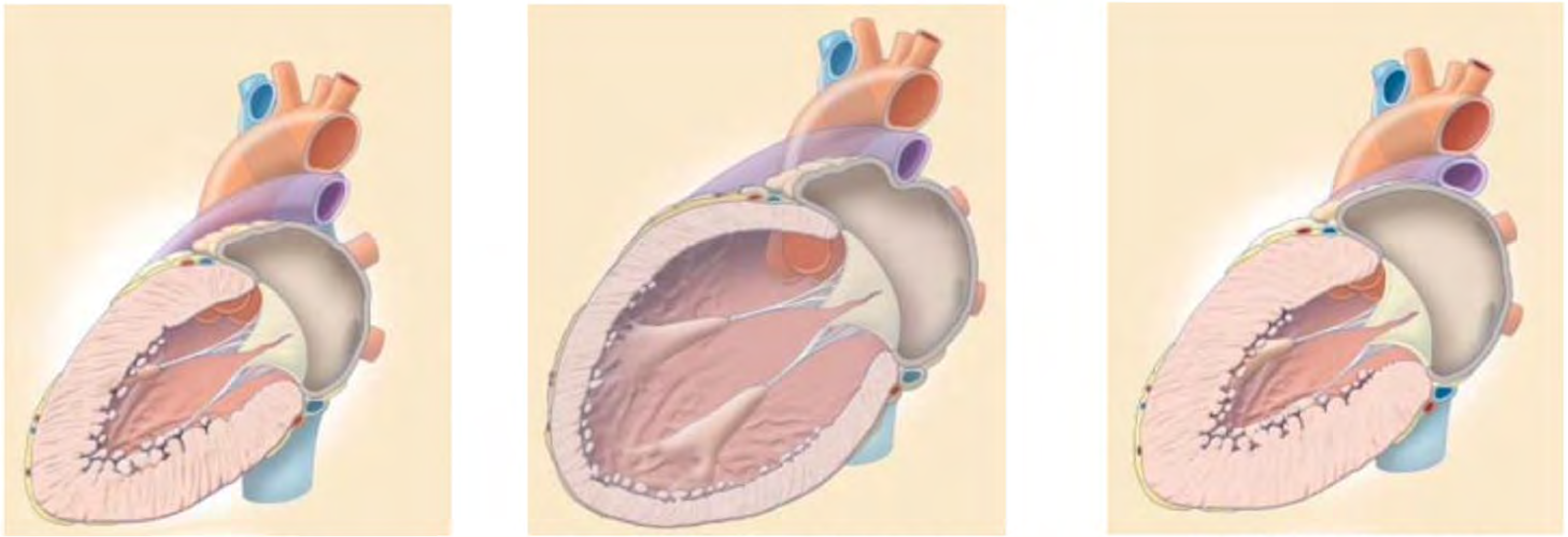
LLC

Defining of Heart Failure

A clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood



Normal Heart | HF with Reduced Ejection Fraction (HF*r*EF) | HF with Preserved Ejection Fraction (HF*p*EF)

Jesus M, Brozena SA. New Engl J Med. 2003; 348:2007-2018
2013 ACCF/AHA Guideline for the Management of Heart Failure. Yancy CW, et al. Circulation. 2013;128:e240 e327.

Latest of Many……

JOURNAL OF CARDIAC FAILURE

CONSENSUS STATEMENT | ARTICLES IN PRESS

Universal Definition and Classification of Heart Failure

A Report of the Heart Failure Society of America, Heart Failure Association of the European Society of Cardiology, Japanese Heart Failure Society and Writing Committee of the Universal Definition of Heart Failure

Biykem Bozkurt, MD, PhD, Chair • Andrew JS Coats, DM, DSC • Hiroyuki Tsutsui, MD, Co-Chair • ...
Clyde Yancy, MD, MSc • Jian Zhang, MD, PhD • Shelley Zieroth, MD • Show all authors

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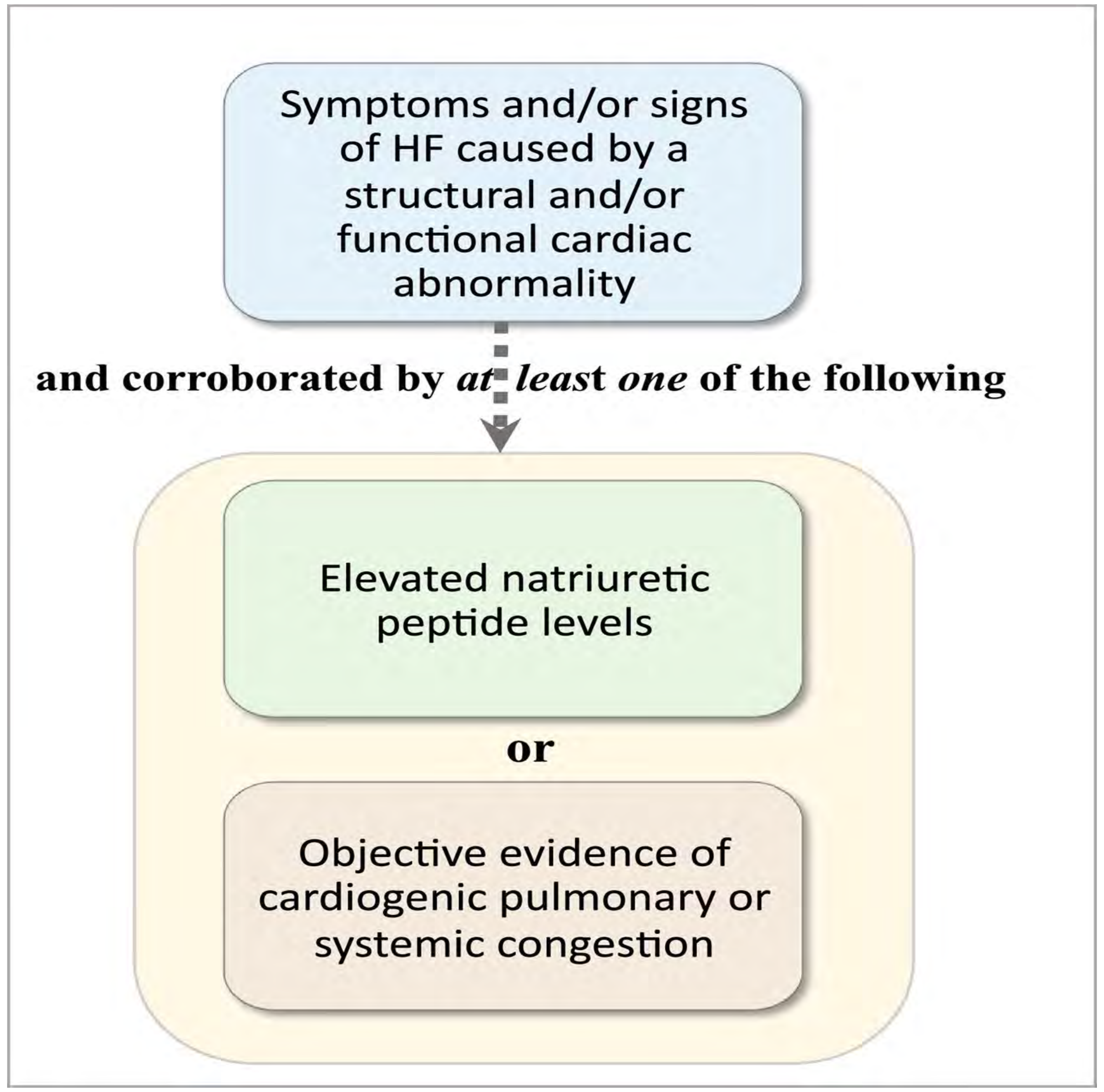
PlumX Metrics



HF with reduced EF (HFrEF):

- HF with LVEF ≤ 40%

HF with mildly reduced EF (HFmrEF):

- HF with LVEF 41-49%

HF with preserved EF (HFpEF):

- HF with LVEF ≥ 50%

HF with improved EF (HFimpEF):

- HF with a baseline LVEF ≤ 40%, a ≥ 10 point increase increase from baseline LVEF, and a second measurement of LVEF > 40%

HF - A Clinical Syndrome of Insufficient Cardiac Output

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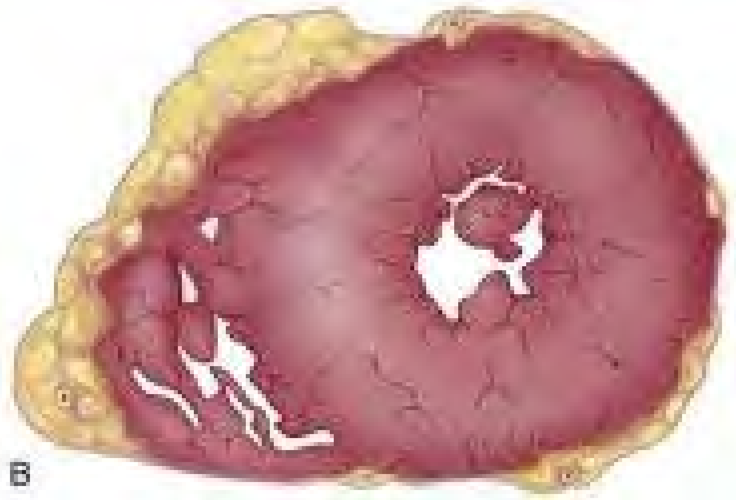
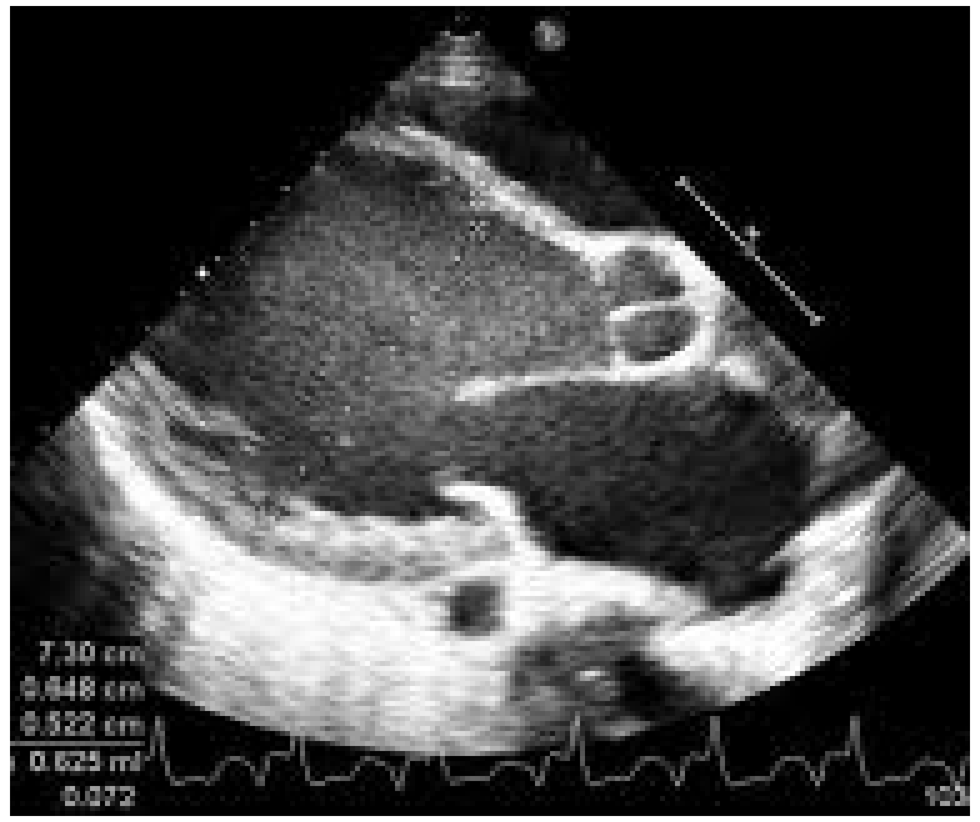
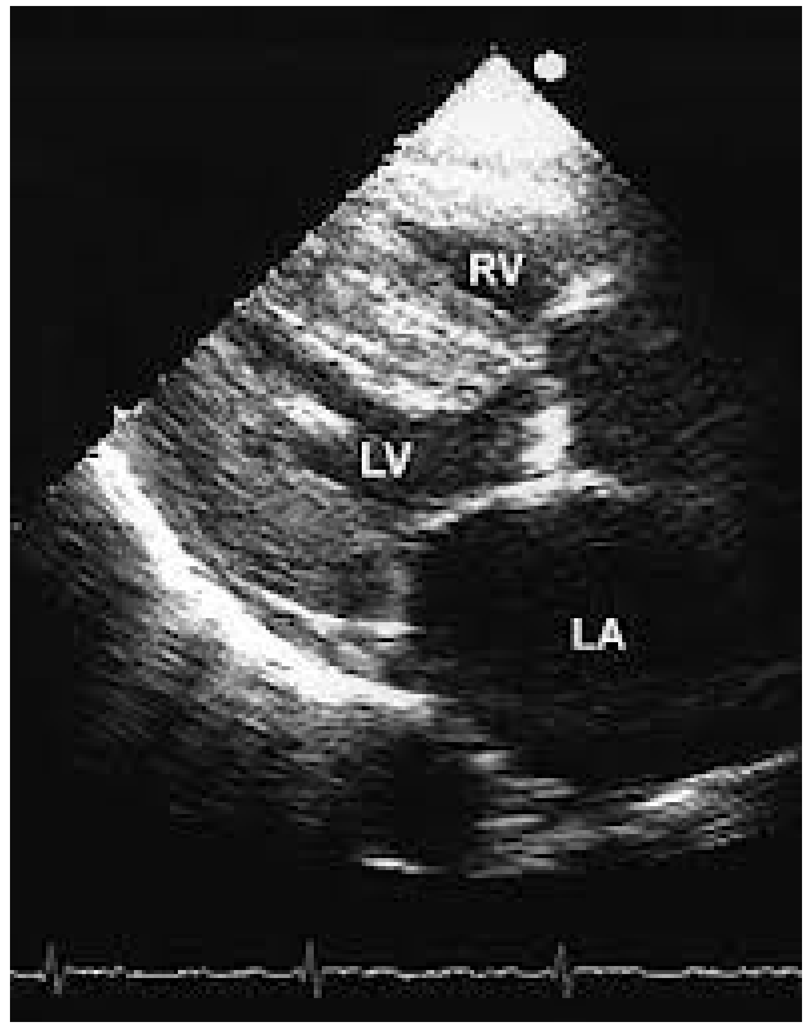
- 60 YO male with long-standing HF
- 3 weeks of worsening SOB
- BP 95/40

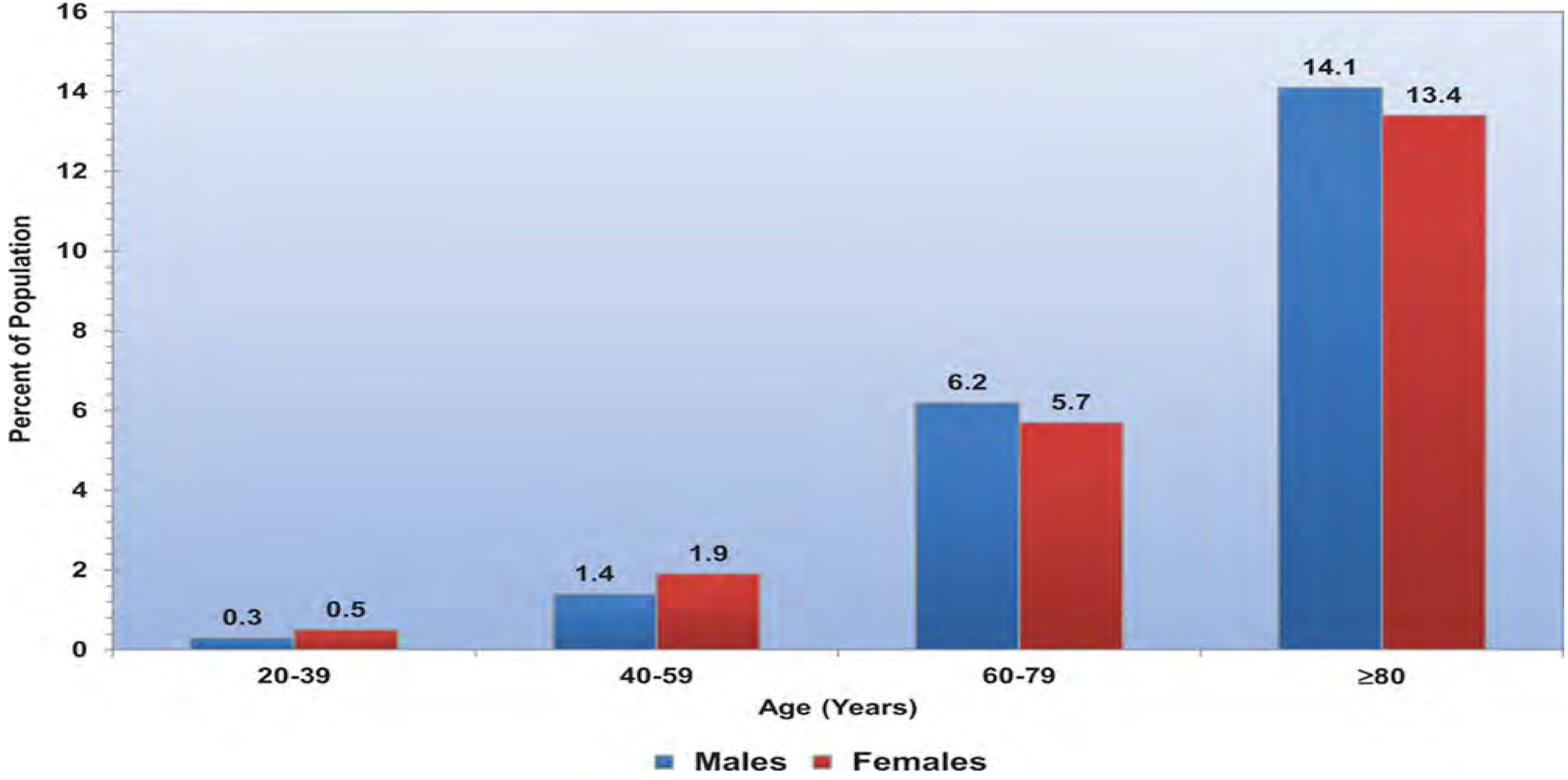
- 80 yo female with long-standing hypertension
- 1 hours of sudden onset of SOB
- BP 185/120







Increasing Prevalence of HF with Aging



Heart Disease and Stroke Statistics—2018 Update: A Report From the American Heart Association, Volume: 137, Issue: 12, Pages: e67-e492, DOI: (10.1161/CIR.0000000000000558)

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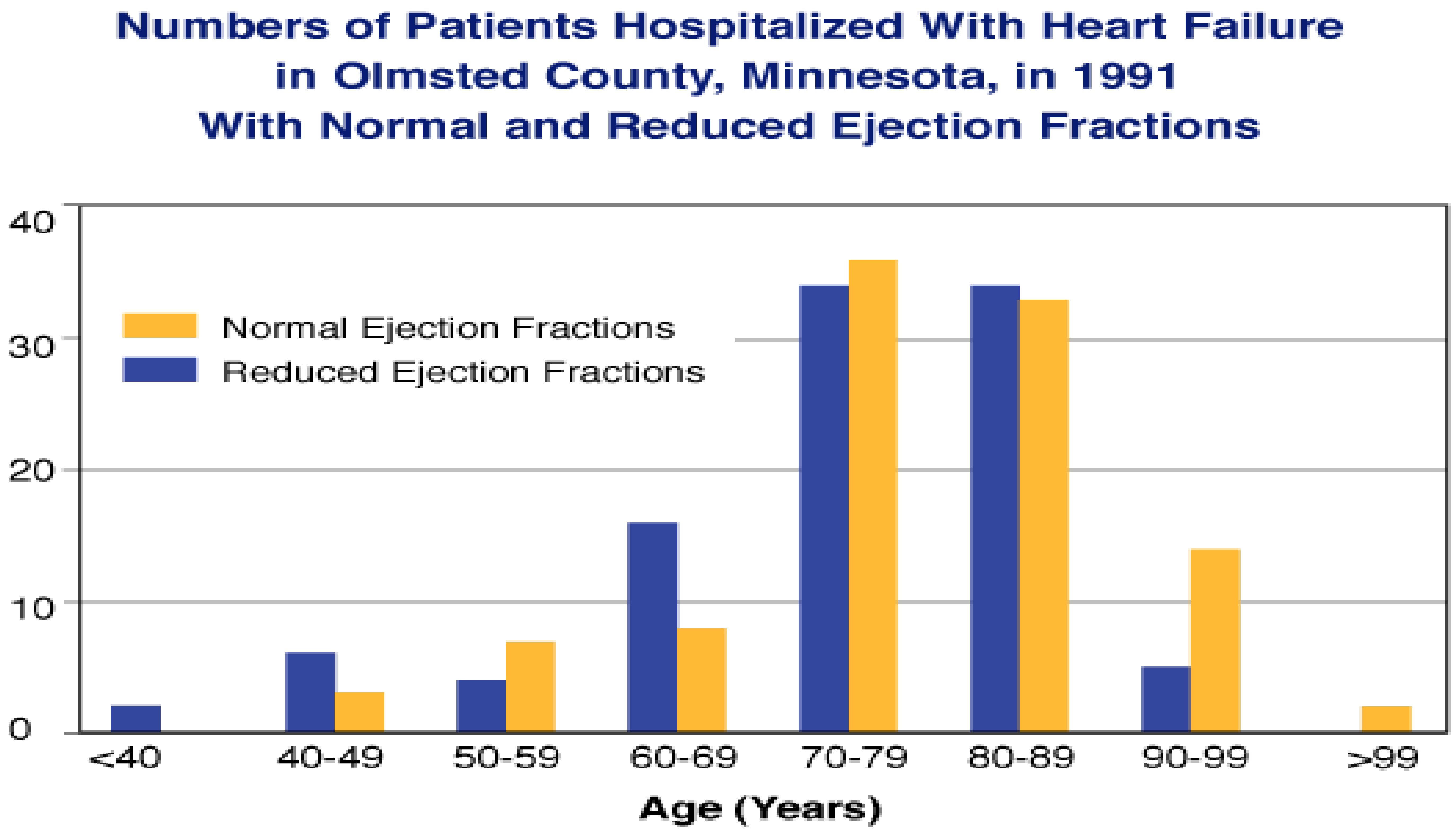
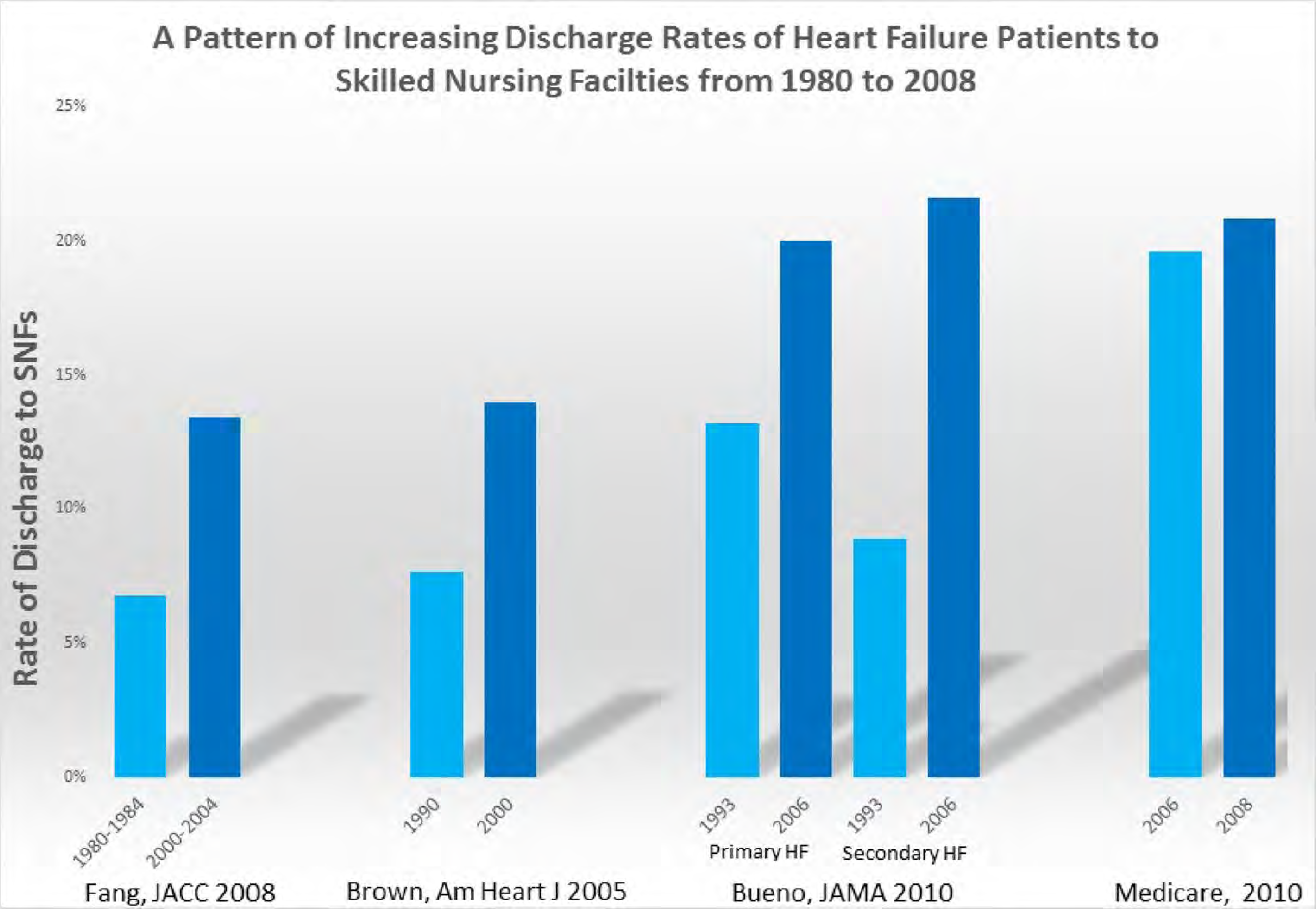
Heart Failure and Aging

Older patients show a particular propensity for developing HF with preserved LV systolic function (HFNEF) and the proportion with HFNEF increases with advancing age.





Orr, Forman, DeMatteis, Gambassi. Current Geriatrics Report 2015

Variable Rate of Discharge to SNFs Among US Hospitals; Higher Rates Not Associated with Lower Readmission

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Figure 5.3 Distribution of Rate of Discharge to SNFs, 2008

Medicare FFS beneficiaries aged ≥65 years

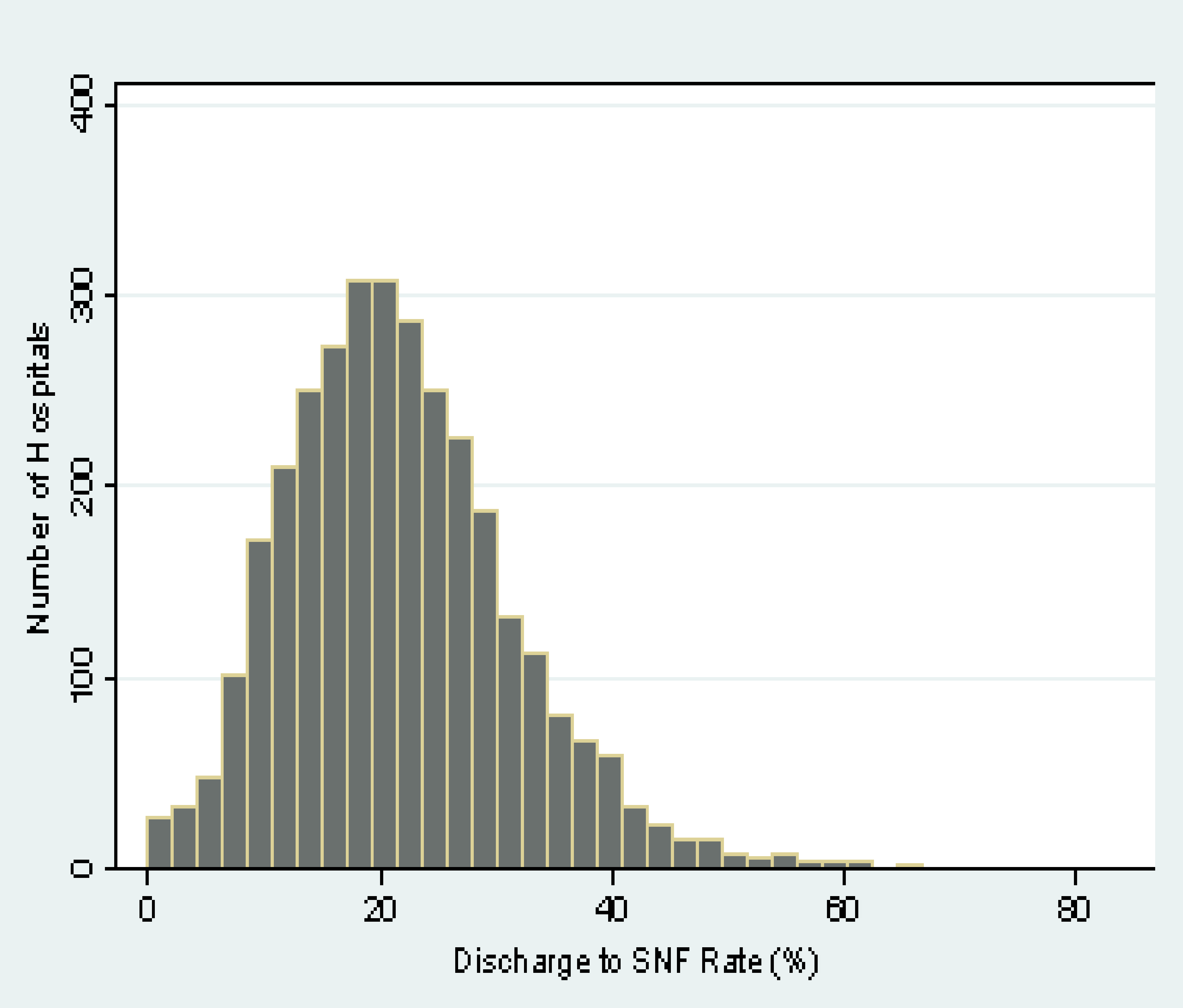
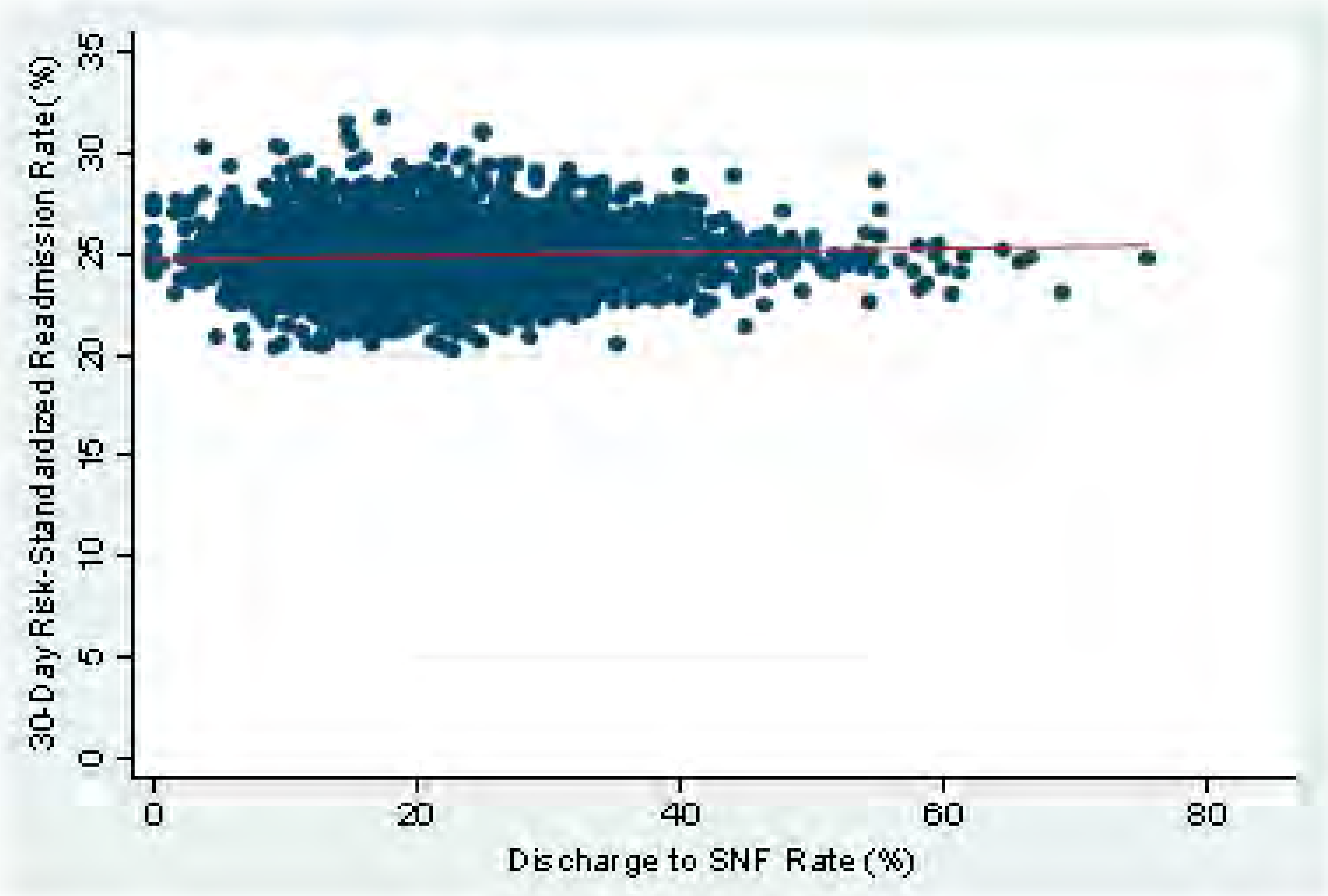


Figure 5.5 Scatterplot of Hospital RSRRs by Rate of Discharge to SNFs

Medicare FFS beneficiaries aged ≥65 years



CMS: Medicare Hospital Quality Chart Book, 2010

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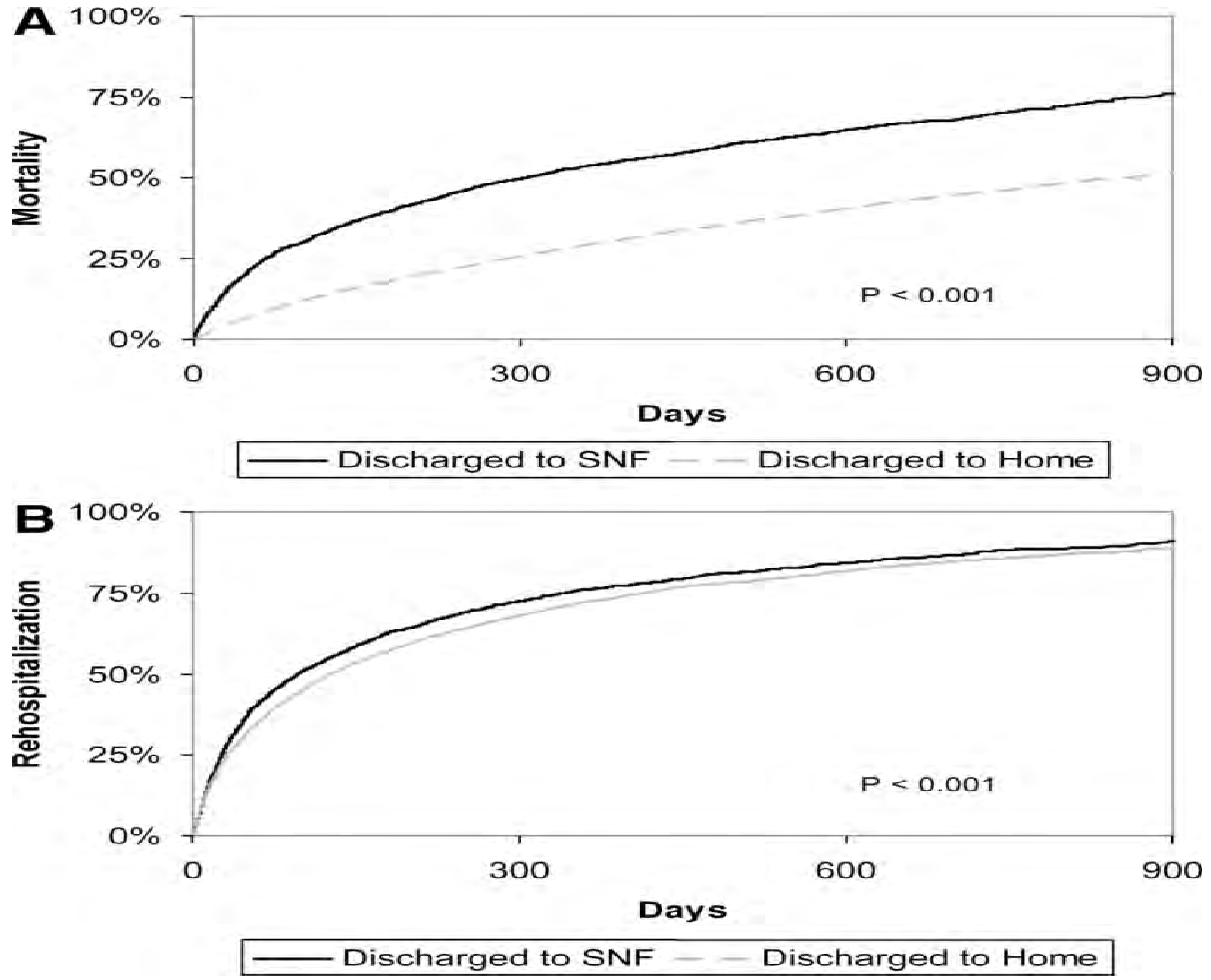
Discharge to a Skilled Nursing Facility and Subsequent Clinical Outcomes Among Older Patients Hospitalized for Heart Failure



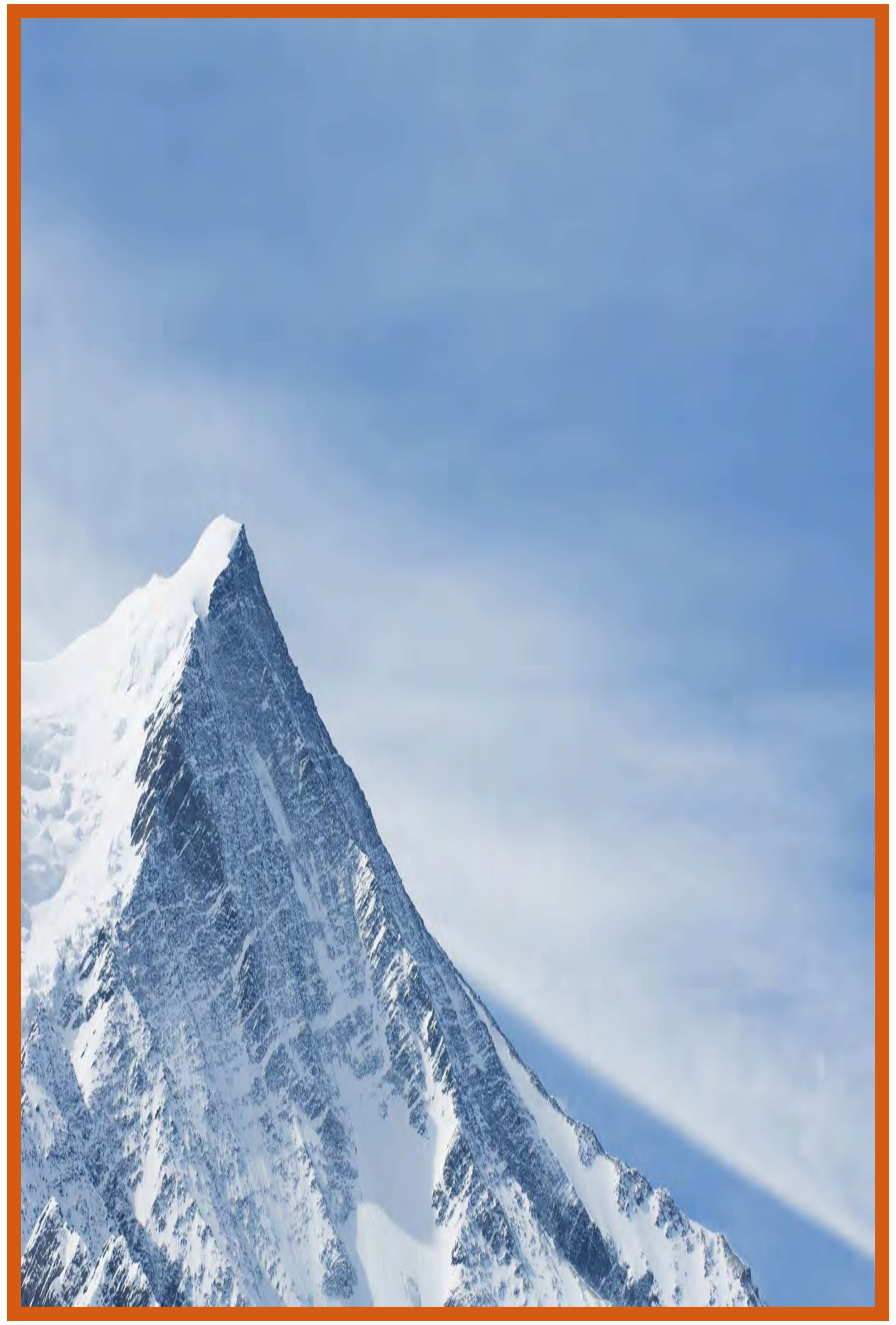
30-day mortality 14.4% vs. 4.1%;
1-year mortality 53.5% vs. 29.1%,

30- day rehospitalization: 27% vs. 23.5%, P<0.0001

Heart Failure in Post-Acute Care - Management Framework

GOALS:

- Improve or maintain medical stability
- Optimize function
- Prepare for community D/C if possible
- Prevent hospital readmission

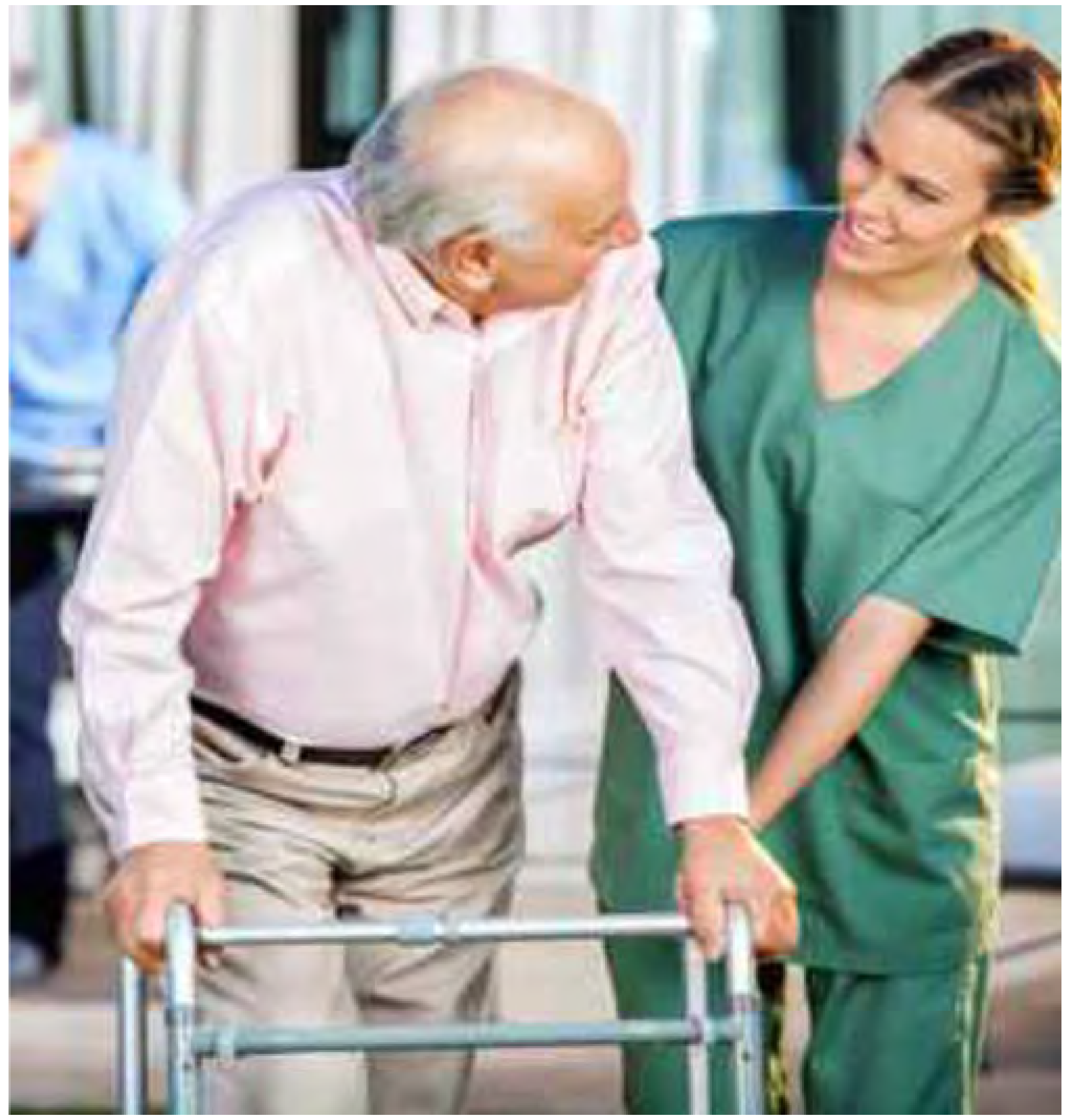


Diagnosis often made pre-SNF admission

- Extensive diagnostic work up not necessary

Patient-Centered Heart Failure Care

Consider the type of SNF HF patient and their goals of care



"Rehabilitation Group"

"Uncertain Prognosis Group"

"Long Term Care Residents"

Recognizing Heart Failure Symptoms in the Elderly

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- Fatigue
- Exercise intolerance
- Dyspnea
- Nocturnal cough
- Altered mental status/worsening cognition
- Lethargy
- Restlessness
- Worsening appetite
- Edema

Anorexia: polypharmacy, depression, palatability, dietary, restrictions

Fatigue: depression, frailty, aging, reduction in activities to avoid symptoms, anemia, hypothyroidism

Exercise intolerance: chronotropic incompetence, PVD, deconditioning

Dyspnea: chronic pulm disease, PNA, pulmonary HTN, changes in vascular tone, lung capacity, HTN

Altered mental status: psychosocial stressors, medications, infections

Edema: venous tone, decreased skin turgor, prolonged sedentary states, idiopathic, medications, renal or hepatic disease

ESC 2016: "Signs and symptoms of HF are often non-specific and do not discriminate well between HF and other clinical conditions"

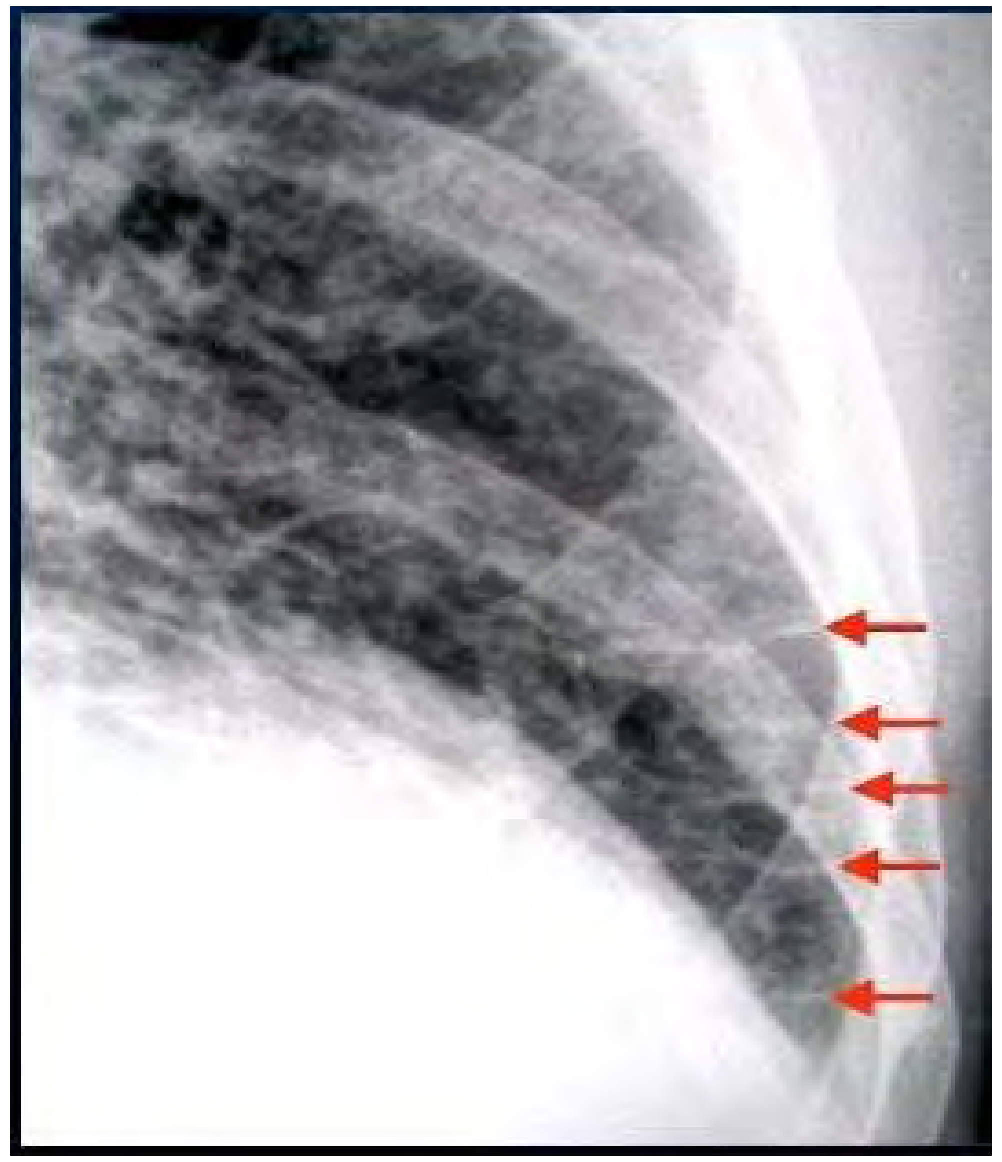
Ponikowski P, et al. Eur J Heart Fail. 2016;18:891-975.

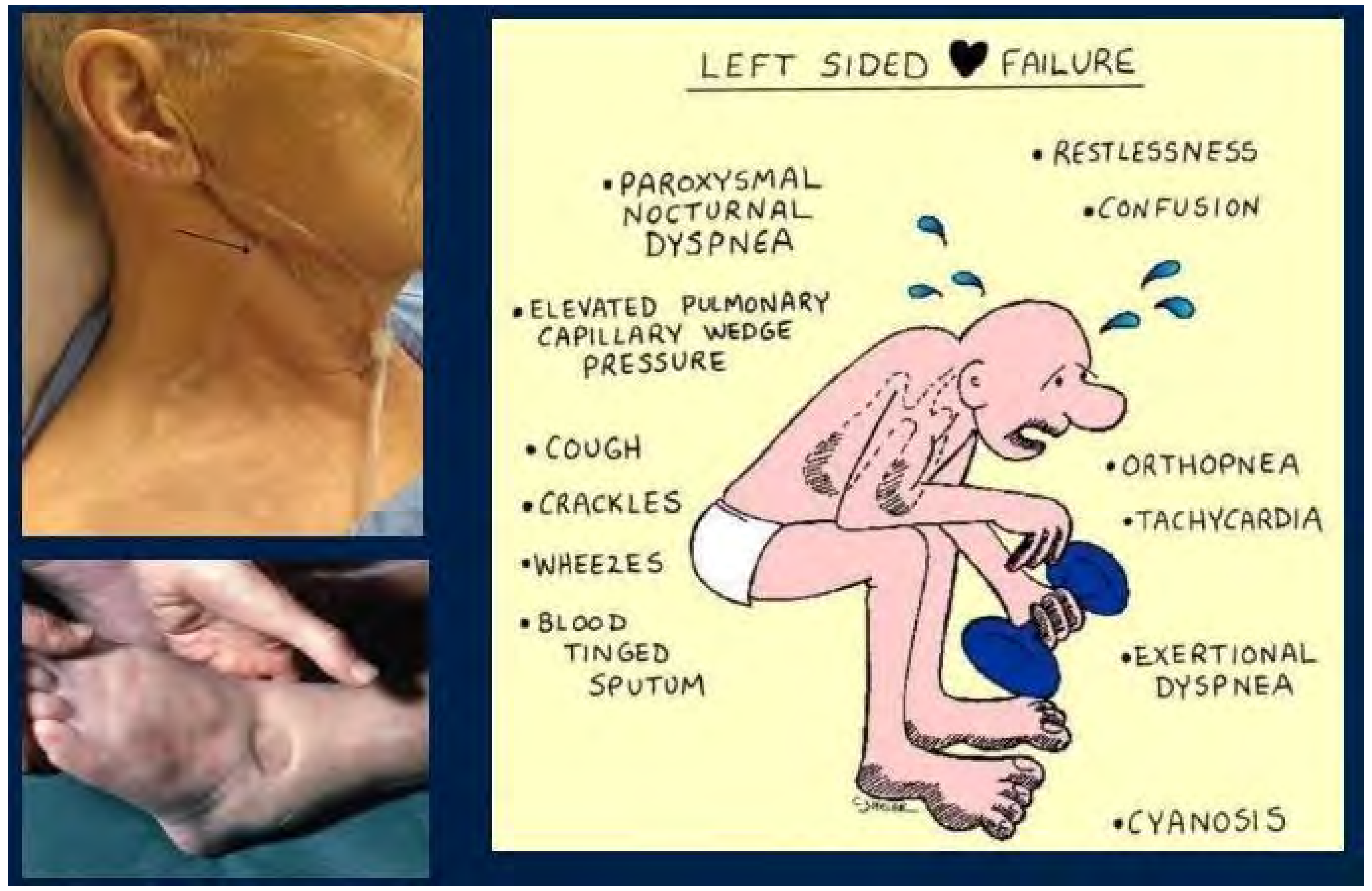
HF Evaluation - Evidence of Volume Overload

Framingham Diagnostic Criteria for Heart Failure*

Major criteria	Minor criteria
Acute pulmonary edema	Ankle edema
Cardiomegaly	Dyspnea on exertion
Hepatojugular reflex	Hepatomegaly
Neck vein distension	Nocturnal cough
Paroxysmal nocturnal dyspnea or orthopnea	Pleural effusion
Rales	Tachycardia (> 120 beats per minute)
Third heart sound gallop	

*—Heart failure is diagnosed when two major criteria or one major and two minor criteria are met.





Bendopnea

Weight Gain

Management Overview

1. Is the patient stable?
2. Cardinal signs of heart failure?

YES! ⇦ ⇨ **NO!**

YES!

1. Reduce Congestion
2. WHY?
3. Obtain/Determine LVEF
4. Patient-centered GDMT

➢ Improve exertional tolerance/function
➢ Return to desired place of dwelling
➢ Avoid hospital admission
➢ Prolong survival

NO!

- History of HF
- WHAT'S HAPPENING IN REHAB?
- Risk factors for HF (HFpEF Score)?
- Comorbidities?
- Treatment strategy aligned with GOC

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Evaluation - Criteria for Hospitalization (if not DNH)

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HEMODYNAMICALLY UNSTABLE

- Tachycardia, >120 bpm
- Hypotension, SBP<80mmHg
- Tachypnea/hypoxia
- Cardiogenic shock
- Altered mentation

MANAGEMENT FAILURE

- Persistent dyspnea
- Edema or weight gain
- Worsening CKD

Reduce Congestion

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- Initial IV dose = 2.5 x or more maintenance
  e.g., 40 mg oral Furosemide = IV bolus of 40-100 mg
- Urine output should be 3-5 liters per day

If not responding:

- Double daily dose
- Triple daily dose
- BID dosing
- Switch to an alternative loop diuretic
- *Furosemide –variable bioavailability
- Add potentiating diuretic
- Reduce exogenous sodium
- Address symptoms according to GOC

Helpful Diuretic References

Conversion:
Furosemide 40mg = Furosemide 20mg IV
= Torsemide 20mg
= Bumetanide 1 mg

Distal tubule:
Metolazone 2.5-5 mg daily
Chlorothiazide 500-1000 mg daily
Hydrochlorothiazide 25-50 mg daily

Know the Risk Factors for Readmission

Chronic Kidney Disease/ Worsening Renal Function*

Hypotension*

Polypharmacy (≥7 Medications)

Diabetes

Multiple Co-morbidities

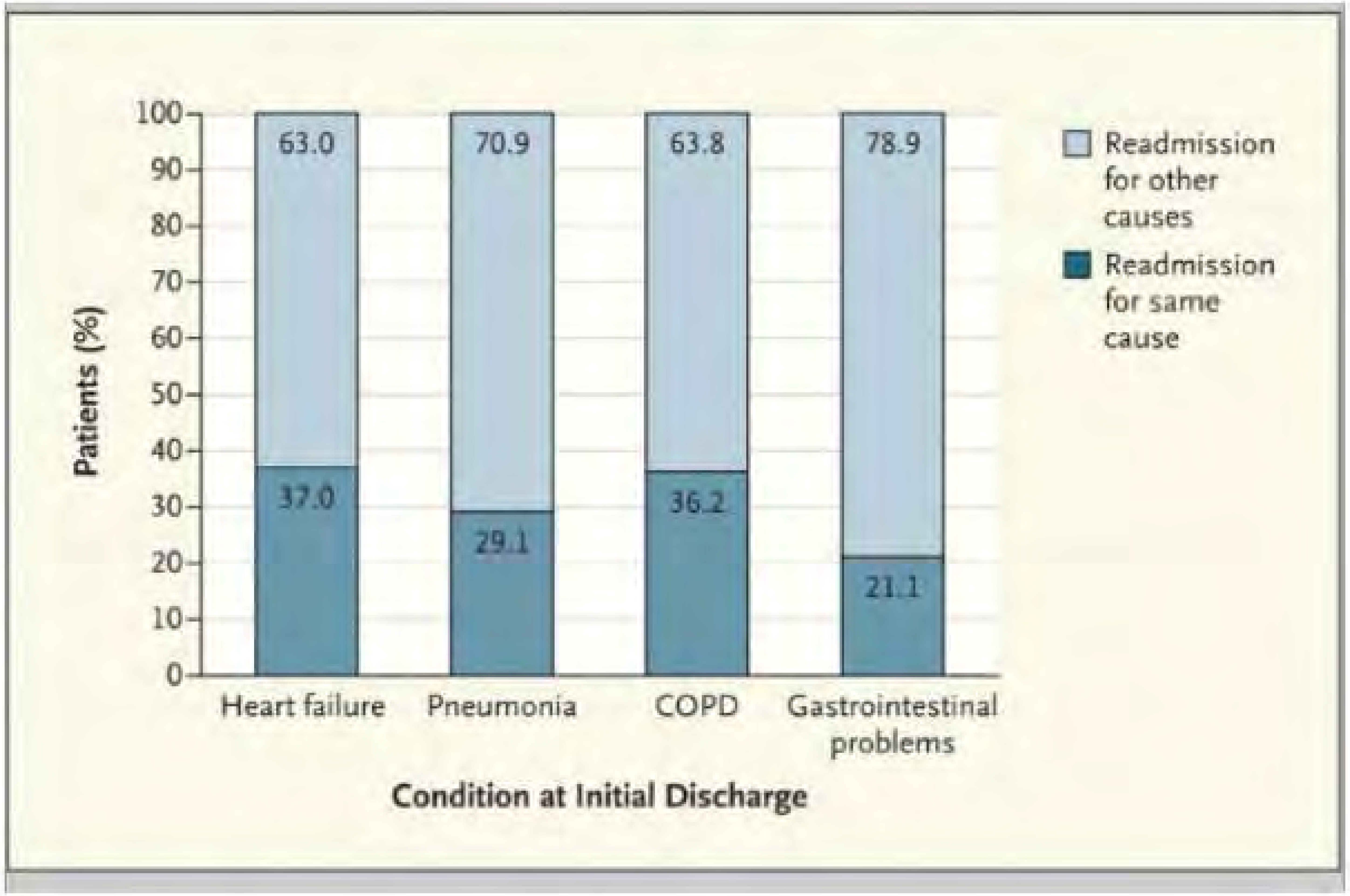
Multiple Prior Admissions

COPD

Persistent NYHA III/IV Symptoms

** Increased mortality risk*

Readmission Diagnosis Often Differs from Index Admission Diagnosis



Krumholz NEJM 2013
Post-Hospital Syndrome — An Acquired, Transient Condition of Generalized Risk

General Management Algorithm

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1. Is the patient stable?
2. Cardinal signs of heart failure?

YES! NO!

1. Reduce Congestion
2. CAUSE OF DECOMPENSATION
3. Obtain/Determine LVEF
4. Patient-centered GDMT for HFrEF

- ➢ Improve exertional tolerance/function
- ➢ Return to desired place of dwelling
- ➢ Avoid hospital admission
- ➢ Prolong survival

- History of HF
- WHAT'S HAPPENING IN REHAB?
- Risk factors for HF (HFpEF Score)?
- Comorbidities?
- Treatment strategy aligned with GOC

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Discern the Cause of Decompensation - New Admissions and Decompensation

- Noncompliance
- Inadequate pre-treatment
  *before/during hospital admission
- Hypertension
- Iatrogenic volume overload
- NSAIDS
- Arrythmia
- Infection
- Addition or increase of negative inotropes (beta blockade/CCB)
- Ischemia
- Thyroid dysfunction
- Anemia

General Management Algorithm

1. Is the patient stable?
2. Cardinal signs of heart failure?

YES! ← → NO!

1. Reduce Congestion
2. WHY?
3. Obtain/Determine LVEF
4. Patient-centered GDMT for HFrEF

- ➢ Improve exertional tolerance/function
- ➢ Return to desired place of dwelling
- ➢ Avoid hospital admission
- ➢ Prolong survival

- History of HF
- WHAT'S HAPPENING IN REHAB?
- Risk factors for HF (HFpEF Score)?
- Comorbidities?
- Treatment strategy aligned with GOC

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Match SNF Based Pharmacologic Therapy to HF Phenotype

- When appropriate, patients should be treated with guideline directed medical therapies, if tolerated and aligned with GOC
- Focused updates include Class I indications for newer agents (ARNIs and SGLT2 inhibitors)
- Know the indications, pharmacology, and side effects on these newer agents as they apply to the geriatric patient admitted post initiation of SNF level care

Match SNF Based Pharmacologic Therapy to HF Phenotype

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Recommendations for treatment of patients with heart failure with preserved ejection fraction and heart failure with mid-range ejection fraction

Recommendations	Class[a]	Level[b]	Ref[c]
It is recommended to screen patients with HFpEF or HFmrEF for both cardiovascular and non-cardiovascular comorbidities, which, if present, should be treated provided safe and effective interventions exist to improve symptoms, well-being and/or prognosis.	I	C	
Diuretics are recommended in congested patients with HFpEF or HFmrEF in order to alleviate symptoms and signs.	I	B	178, 179

HFmrEF = heart failure with mid-range ejection fraction; HFpEF = heart failure with preserved ejection fraction.
[a]Class of recommendation.
[b]Level of evidence.
[c]Reference(s) supporting recommendations.

AT RISK FOR HEART FAILURE

STAGE A
At high risk for HF but without structural heart disease or symptoms of HF

e.g., Patients with:
- HTN
- Atherosclerotic disease
- DM
- Obesity
- Metabolic syndrome

OR

Patients
- Using cardiotoxins
- With family history of cardiomyopathy

Structural heart disease

THERAPY

Goals
- Heart healthy lifestyle
- Prevent vascular, coronary disease
- Prevent LV structural abnormalities

Drugs
- ACEI or ARB in appropriate patients for vascular disease or DM
- Statins as appropriate

STAGE B
Structural heart disease but without signs or symptoms of HF

e.g., Patients with:
- Previous MI
- LV remodeling including LV Hand low EF
- Asymptomatic valvular disease

Development of symptoms of HF

THERAPY

Goals
- Prevent HF symptoms
- Prevent further cardiac remodeling

Drugs
- ACEI or ARB as appropriate
- Beta blockers as appropriate

In selected patients
- ICD
- Revascularization or valvular surgery as appropriate

HEART FAILURE

STAGE C
Structural heart disease with prior or current symptoms of HF

e.g., Patients with:
- Known structural heart disease and
- HF signs and symptoms

Refractory symptoms of HF at rest, despite GDMT

HF*p*EF

THERAPY

Goals
- Control symptoms
- Improve HRQOL
- Patient education
- Prevent hospitalization
- Prevent mortality

Strategies
- Identification of comorbidities

Treatment
- Diuresis to relieve symptoms of congestion
- Follow guideline driven indications for comorbidities, e.g., HTN, AF, CAD, DM
- Revascularization or valvular surgery as appropriate

HF*r*EF

THERAPY

Goals
- Control symptoms
- Improve HRQOL
- Patient education
- Prevent hospitalization
- Prevent mortality

Drugs for routine use
- Diuretics for fluid retention
- ACEI or ARB
- ARNI
- Beta blockers
- Aldosterone antagonists

Drugs for use in selected patients
- Hydralazine/isosorbide dinitrate
- ACEI and ARB
- Ivabradine
- Digoxin

Inselected patients
- CRT
- ICD
- Revascularization or valvular surgery as appropriate

STAGE D
Refractory HF

e.g., Patients with:
- Marked HF symptoms at rest
- Recurrent hospitalizations despite GDMT

THERAPY

Goals
- Control symptoms
- Improve HRQOL
- Reduce hospital readmissions
- Establish patient's end-of-life goals

Options
- Advanced care measures
- Heart transplant
- Chronic inotropes
- Temporary or permanent MCS
- Experimental surgery or drugs
- Palliative care and hospice
- ICD deactivation

Stages in the development of HF and recommended therapy by stage. ACEI indicates angiotensin-converting enzyme inhibitor; AF, atrial fibrillation; ARB, angiotensin-receptor blocker; CAD, coronary artery disease; CRT, cardiac resynchronization therapy; DM, diabetes mellitus; EF, ejection fraction; GDMT, guideline-directed medical therapy; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; HRQOL, health-related quality of life; HTN, hypertension; ICD, implantable cardioverter-defibrillator; LV, left ventricular; LVH, left ventricular hypertrophy; MCS, mechanical circulatory support; and MI, myocardial infarction. Adapted from Hunt et al.[3]
Yancy CW et al., ACCF/AHA Guideline for the Management of Heart Failure, *Circulation*, 10/15/13.
Yancy CW et al., 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure, Circulation, 08/08/2017.

American Heart Association.

Sacubitril/Valsartan

Combination of a neprilysin inhibitor and an angiotensin II receptor blocker

Neprilysin inhibition with sacubitril ← Sacubitril/valsartan → RAAS suppression with valsartan

Increases effects of endogenous compensatory peptides
↑Vasodilation
↑ Natriuretic and diuretic effects
↓Proliferation
↓Hypertrophy
↓ SNS outflow/sympathetic tone
↓ Aldosterone secretion
↓ Detrimental effects of vascular remodelling

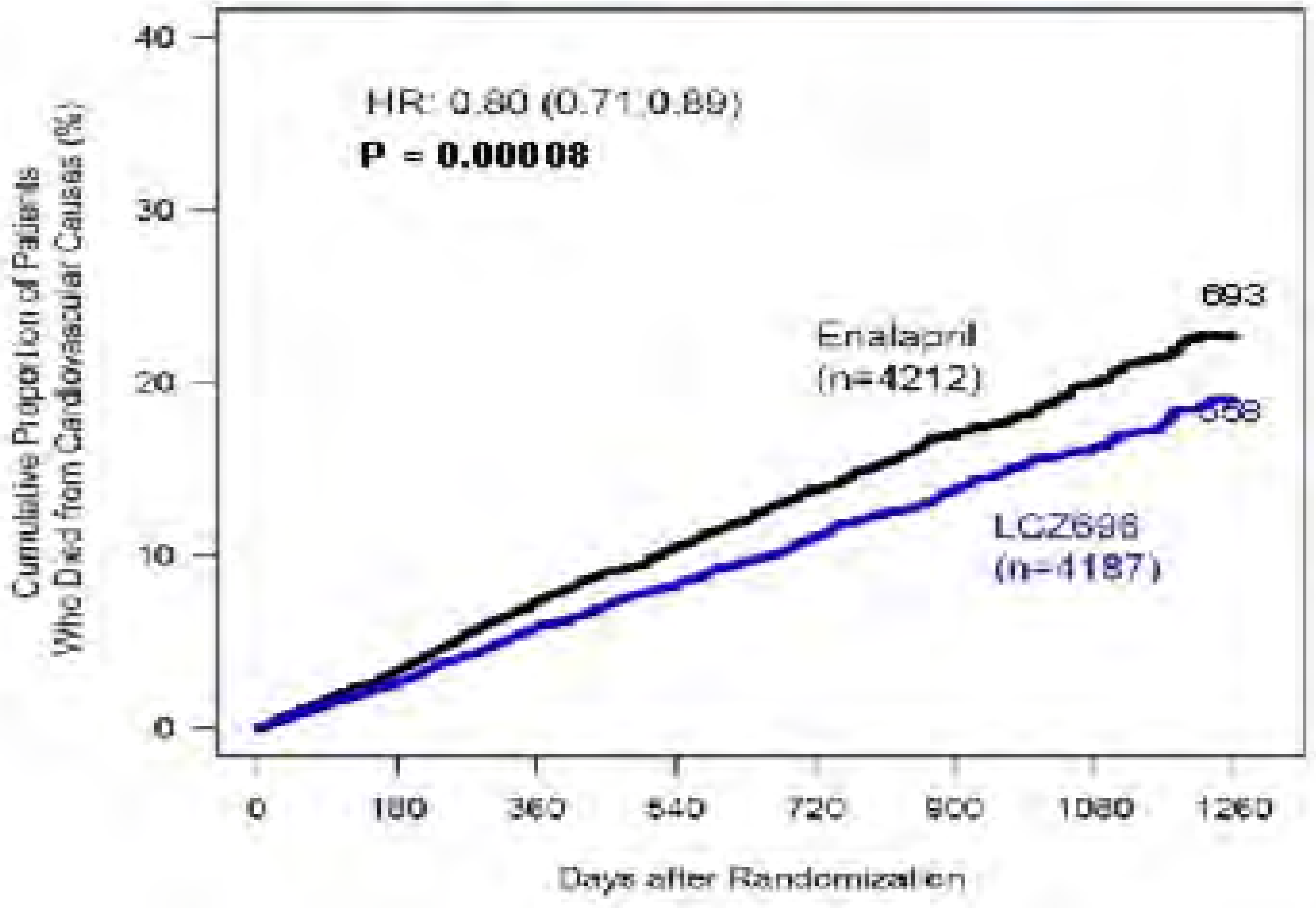
Suppresses RAAS-mediated effects
↓ Vasoconstriction
↓ Sodium and water retention
↓ Ventricular hypertrophy/remodeling
↓ Aldosterone secretion
↓ Cardiac fibrosis
↓ Sympathetic tone
↓ Systemic vascular resistance

1. Levin ER et al. N Engl J Med. 1998;339(5):321-328; 2. Nathisuwan S, Talbert RL. Pharmacotherapy. 2002;22(1):27-42; 3. Schrier RW, Abraham WT. N Engl J Med. 2009;341(8):577-585; 4. Langenickel TH, Dole WP. Drug Discov Today: Ther Strateg. 2012;9(4):e131-139.

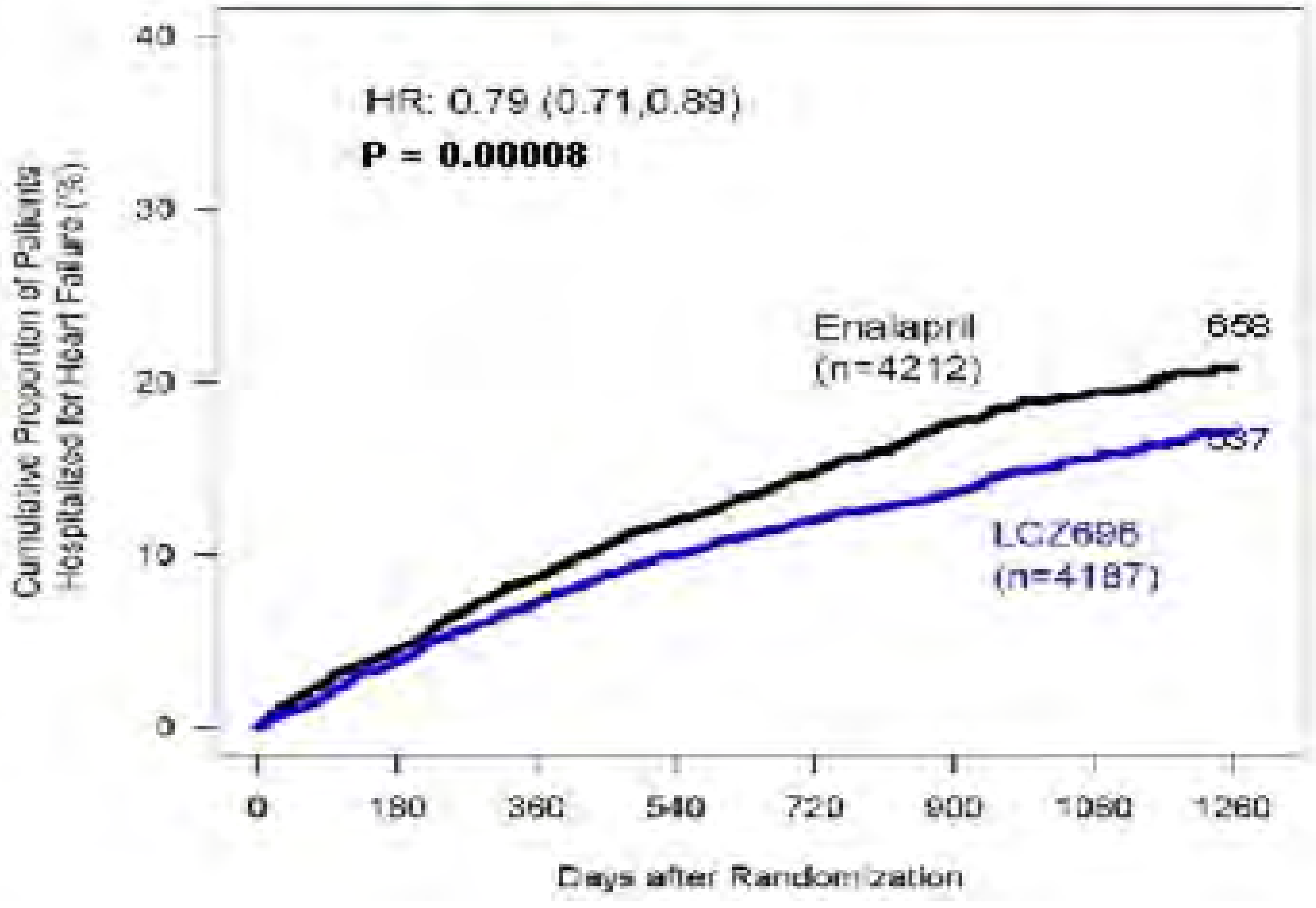
PARADIGM-HF: CV Death or HF Hospitalization

Primary composite outcome
HR: 0.80 (0.73, 0.87) p = 0.0000004

Death from CV causes
20% risk reduction



HF hospitalization
21% risk reduction

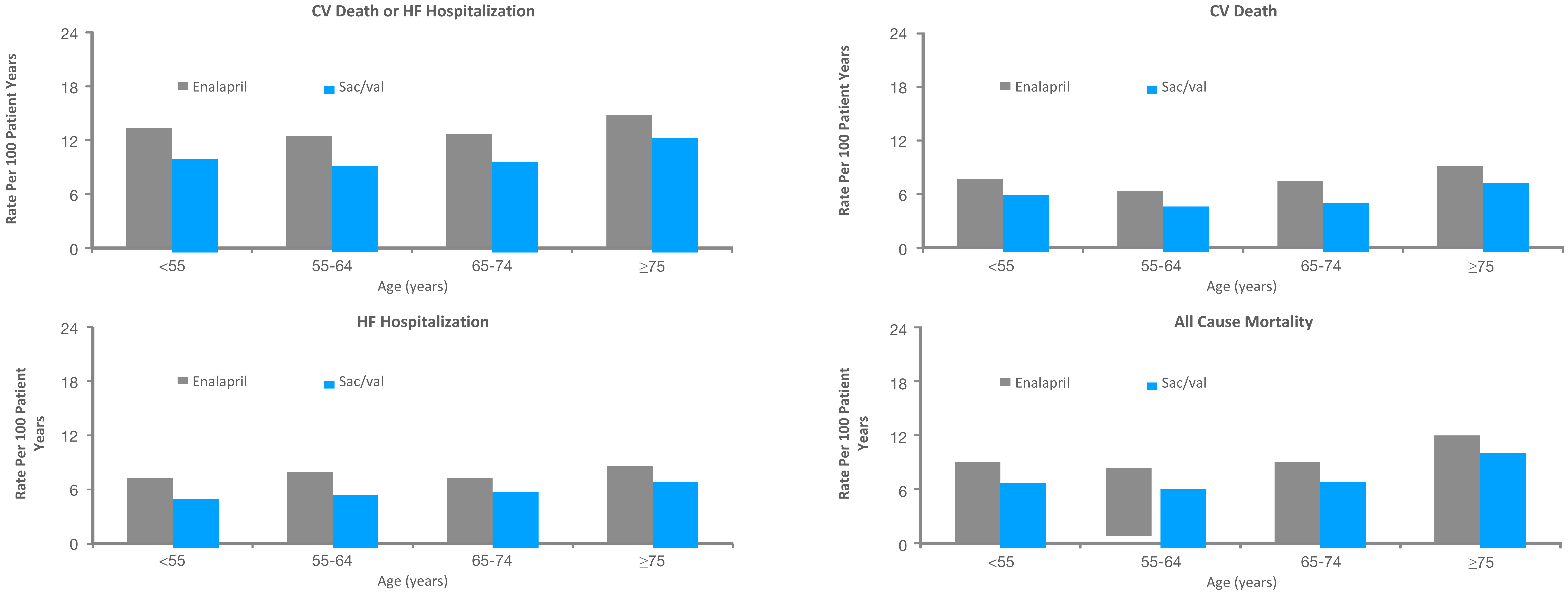


McMurray JJ et al. N Engl J Med. 2014;371:993 1004.

PARADIGM-HF: Effect According to Age

Results: Clinical Outcomes

Rate per 100 patient years of each outcome according to randomized treatment and age group

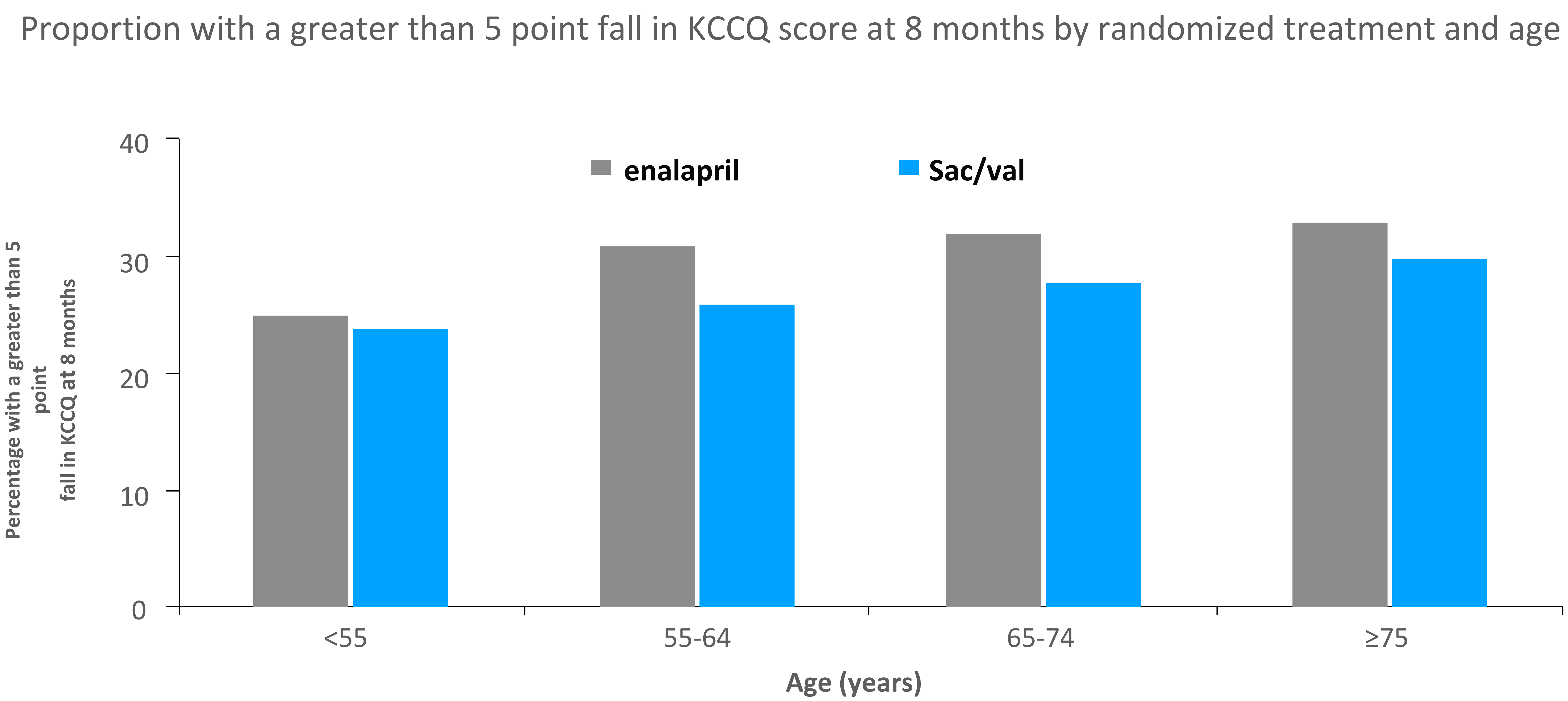


The rate of each outcome was lower in those treated with sacubitril/valsartan compared with enalapril

Jhund PS, et al. Eur Heart J. 2015;36(38):2576–2584.

PARADIGM-HF: Effect on QOL According to Age

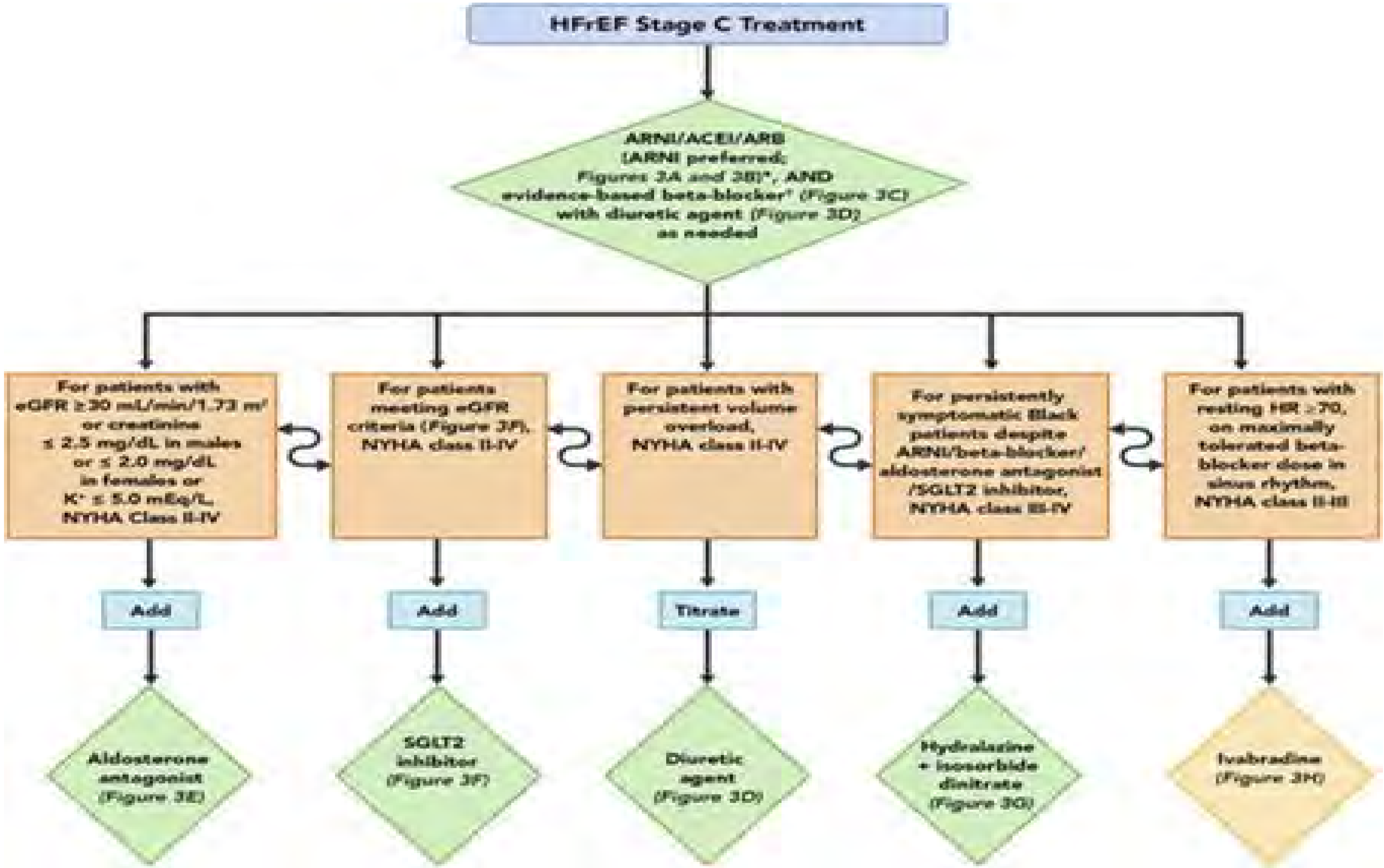
The Kansas City Cardiomyopathy Questionnaire Scores



The benefit of sacubitril/valsartan over enalapril in preventing worsening of KCCQ was consistent across the age groups (p for interaction=0.90)

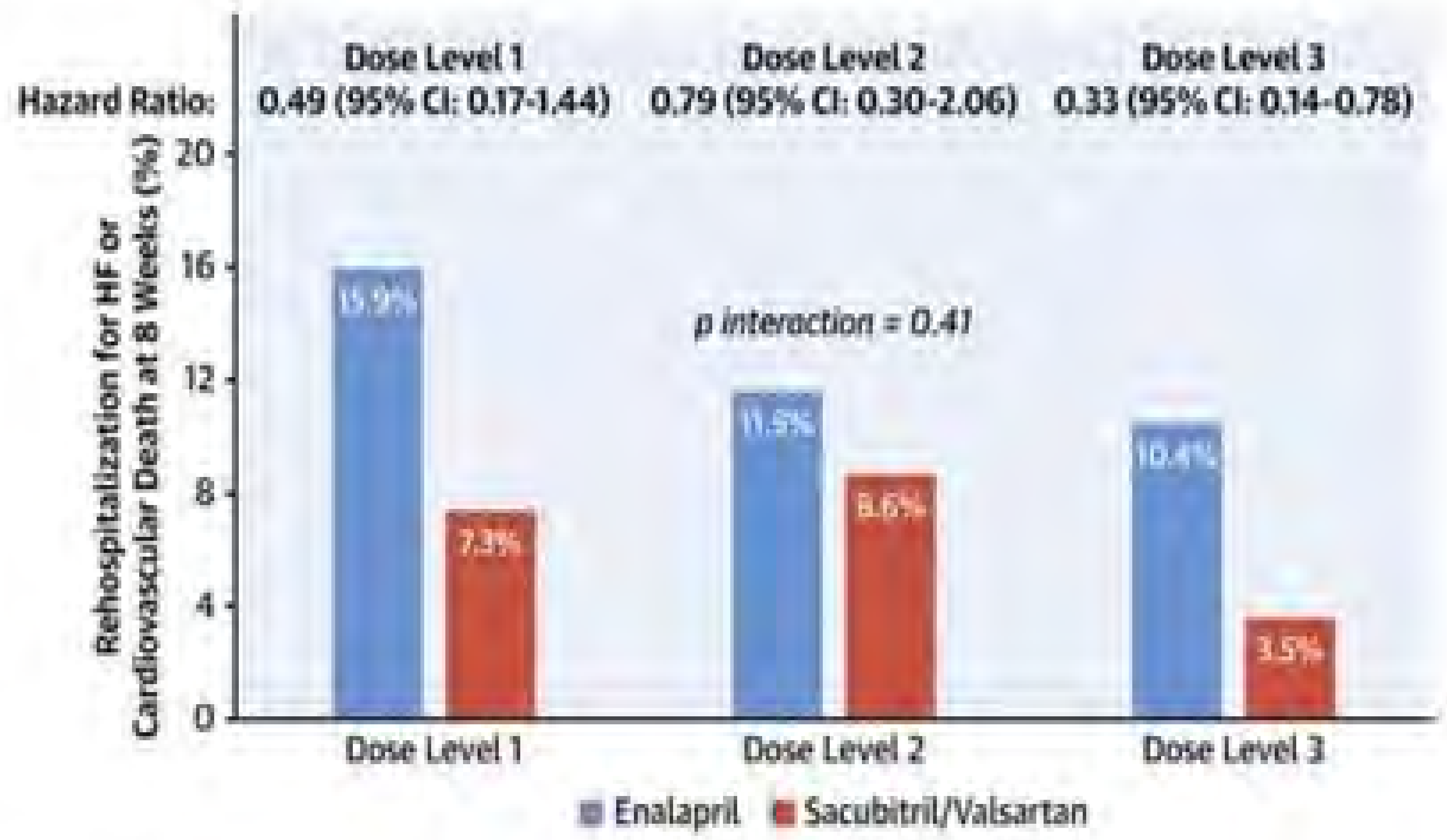
Jhund PS, et al. Eur Heart J. 2015;36(38):2576–2584.

2021 Update to the 2017 ACC Expert Consensus Decision Pathway for Optimization of Heart Failure Treatment: Answers to 10 Pivotal Issues About Heart Failure With Reduced Ejection Fraction: A Report of the American College of Cardiology Solution Set Oversight Committee

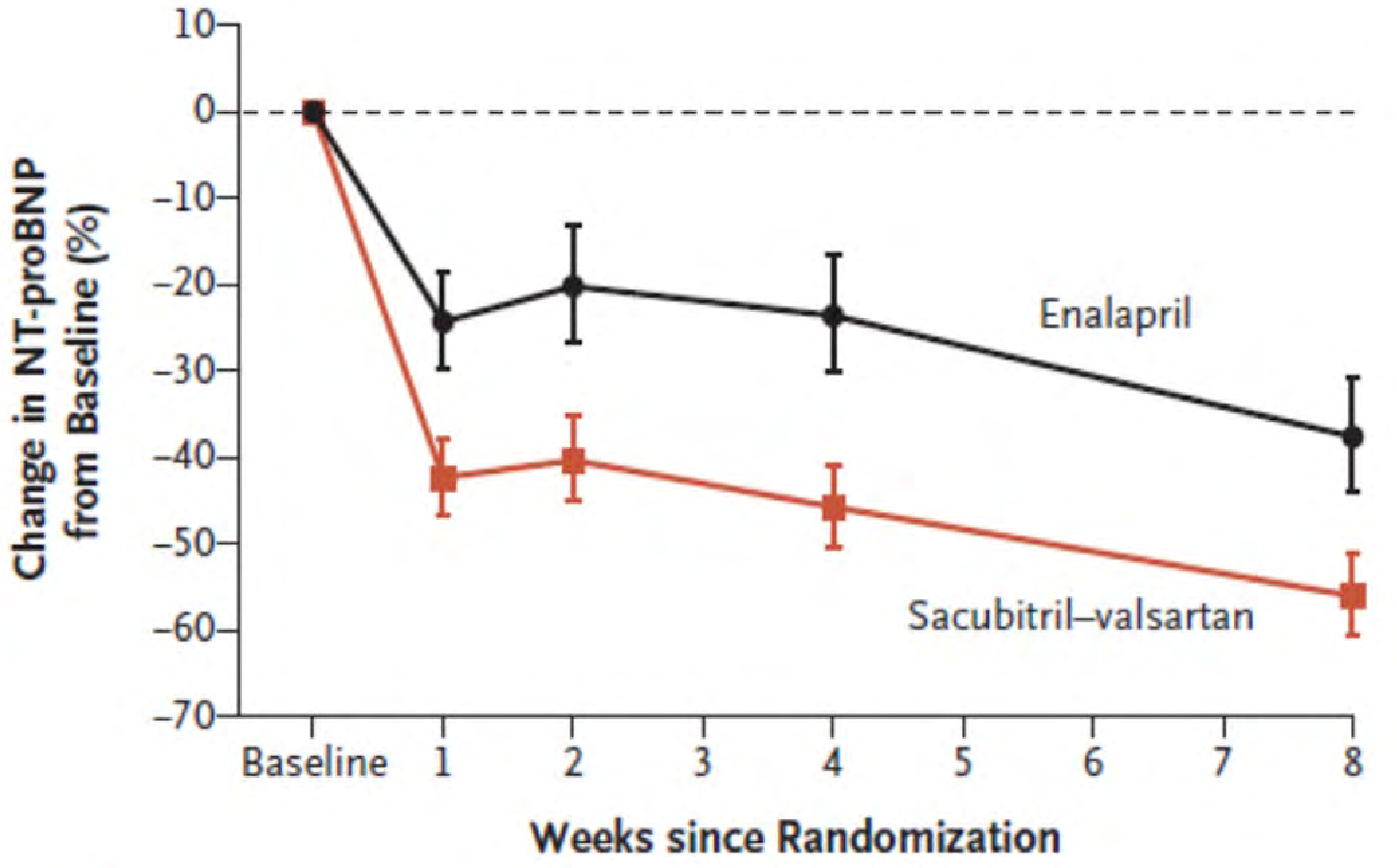


JACC 2021 Feb, 77 (6) 772–810

PIONEER-HF: Sacubitril-Valsartan Initiated in Hospitalized HF Patients



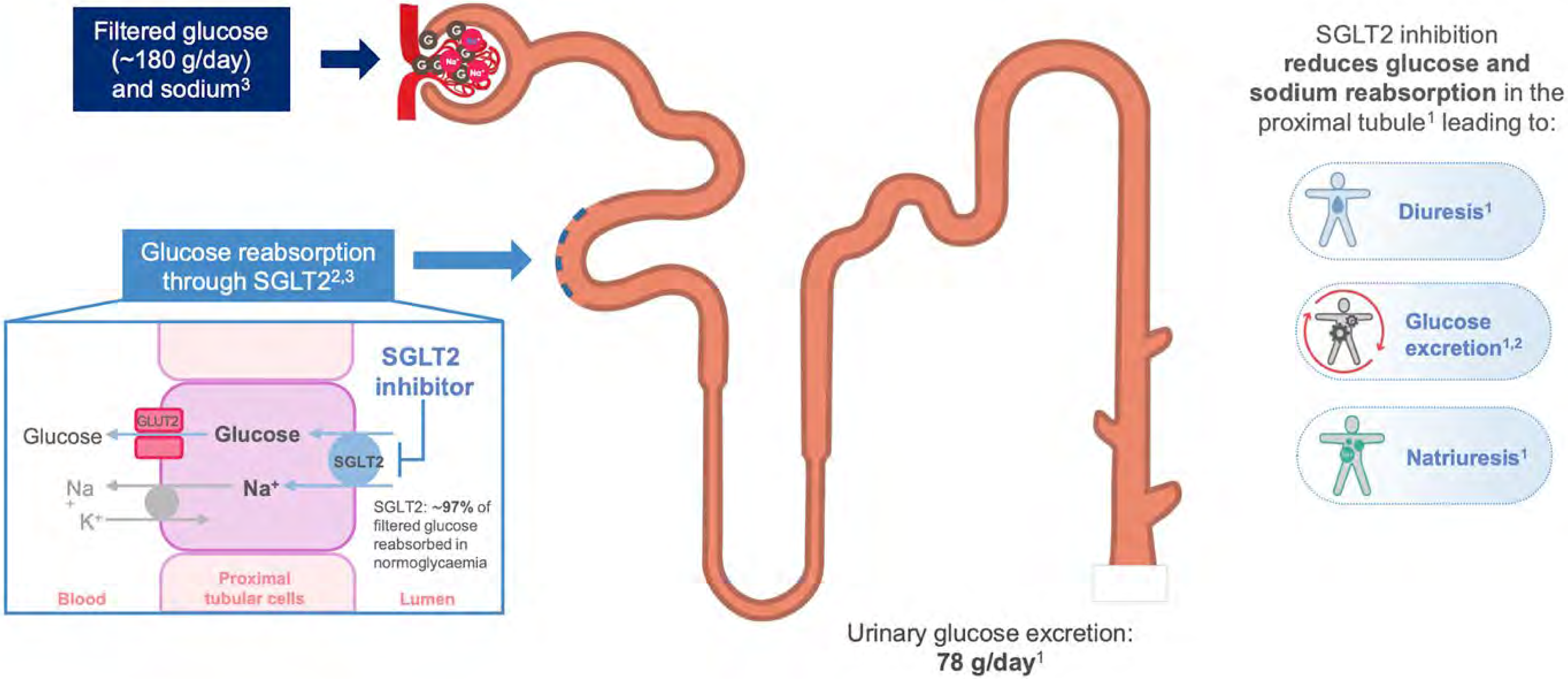
Berg, D.D. et al. J Am Coll Cardiol HF. 2020;8(10):834-43.



No. at Risk

	Baseline	1	2	4	8
Enalapril	394	359	351	350	348
Sacubitril–valsartan	397	355	363	365	349

SGLT2 Inhibitors: Mechanism of Action - Facilitates Renal Excretion of Glucose

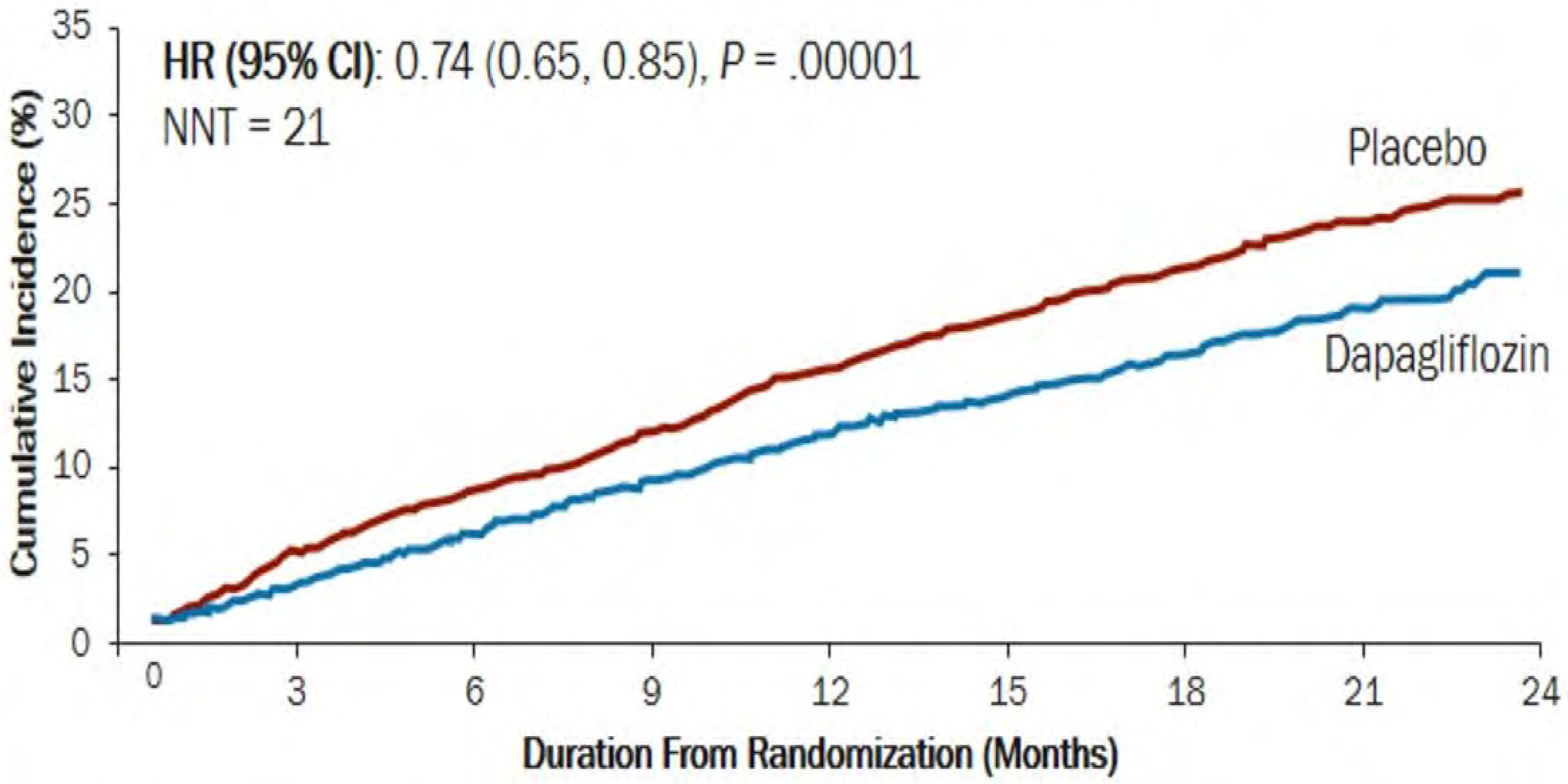


GLUT2, glucose-transporter-2; SGLT2, sodium-glucose co-transporter-2

1. Heise T et al. Clin Ther 2016;38:2265. 2. Vallon V & Thomson SC. Diabetologia 2017;60:215. 3. Bakris GL *et al. Kidney Int* 2009;75:1272

DAPA - HF Study

CV Death/HF Hospitalization/Urgent HF Visit

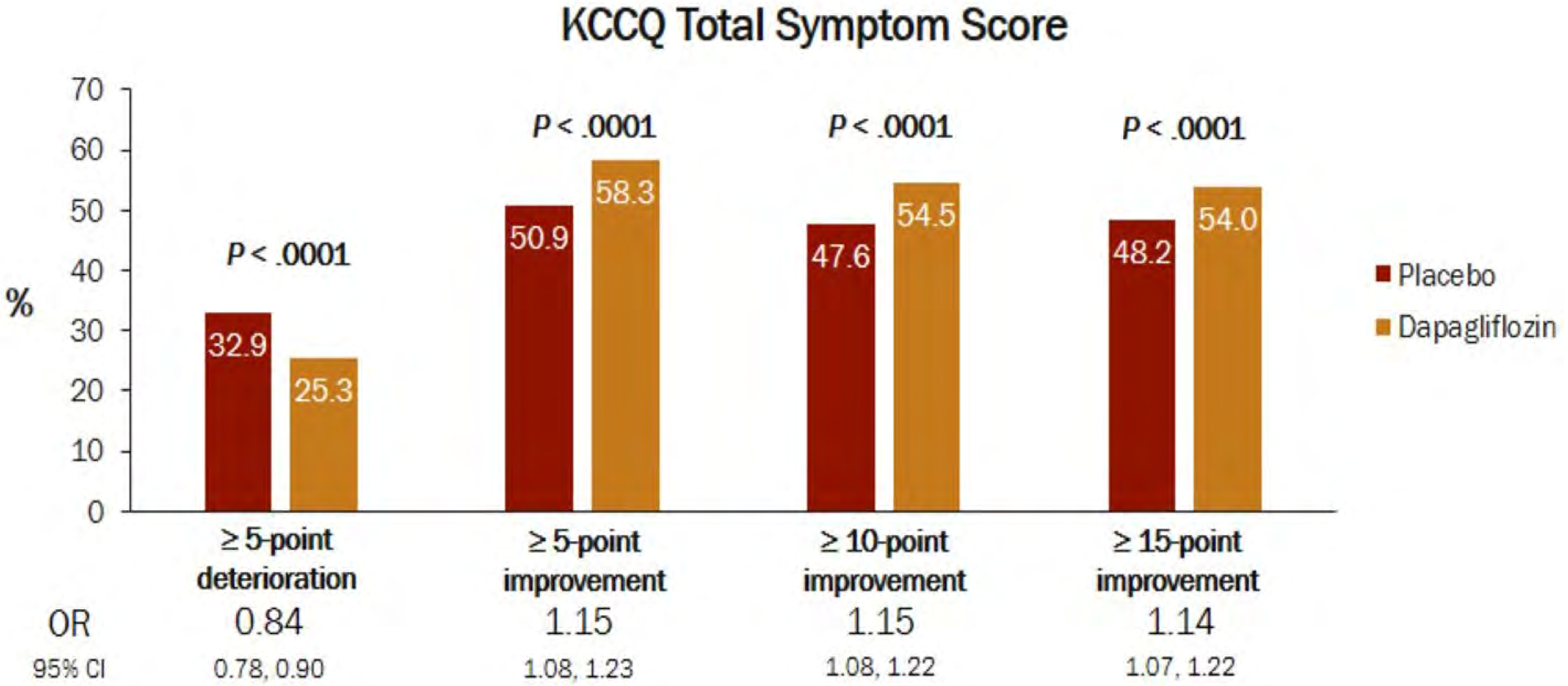


No. at Risk

Dapagliflozin	2373	2305	2221	2147	2002	1560	1146	612	210
Placebo	2371	2258	2163	2075	1917	1478	1096	593	210

McMurray JJ, et al. N Engl J Med. 2019;381:1995-2008.

SGLT2 Inhibitors - Effect on Quality of Life



Kosiborod MN, et al. Circulation. 2020;141:90-99.

Practical Tips for the Management of SNF HFrEF Patients Post Hospitalization

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- Sacubitril/Valsartan and SGLT2 Inhibitors will be seen more frequently
  ** Diuretic properties, check volume status with hemodynamic alterations

- Diuretic requirements may decrease with positive remodeling

- ARBs – less vasodilatory, so may consider in setting of hypotension

- Carvedilol - more vasoactive, start if patient hypertensive.

- Furosemide – variable bioavailability, consider other loop agents: torsemide bumetanide

- Monitor magnesium

- Don't start BB while patient is still volume overloaded

- Once euvolemic, resume or titrate GDMT according to patient preferences

What to Do with Chronic Maintenance Therapy in ADHF

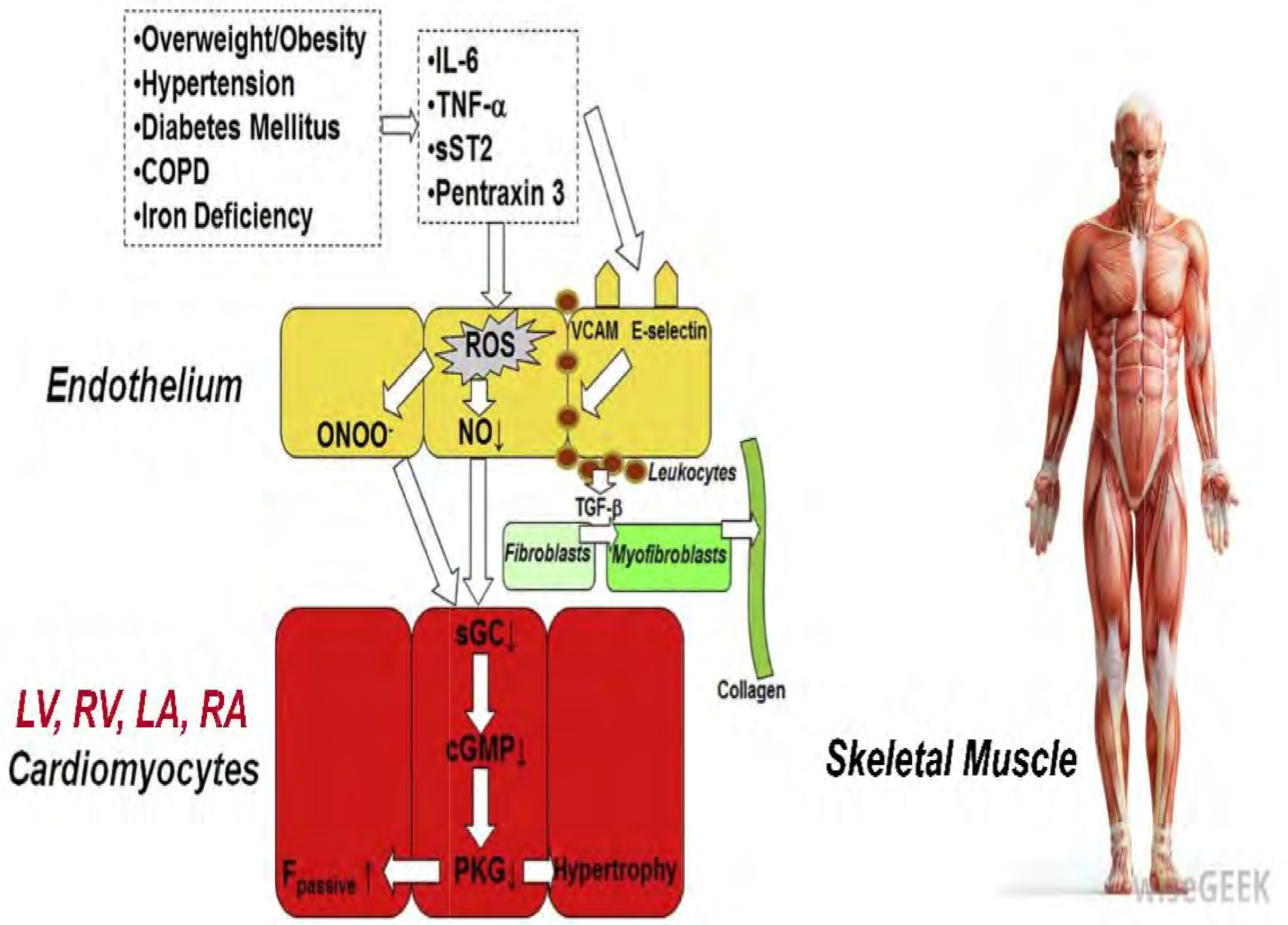
- Continue ACE/ARB unless hypotensive, AKI, hyperkalemic
- Beta-blockers:
  - Mild HF - Continue
  - Moderate HF - Drop 50%
  - Severe HF (shock, inotrope needed) - Hold before transfer
- Don’t start BB while patient is still volume overloaded
- Avoid non-dihydropyridine CCB in HFrEF
- Once euvolemic, resume or titrate GDMT according to patient preferences

HFpEF - Evolving Understanding of the Pathophysiology

Hypertension

Concentric LVH
Fibrosis

Diastolic Dysfunction



Co-Morbidities - Mimics or Makers

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Chronic Lung Disease

Diabetes

Age

Obesity

HTN

Renal dysfunction

Dyslipidemia

Anemia

HFpEF - NOT Just the Left Ventricle

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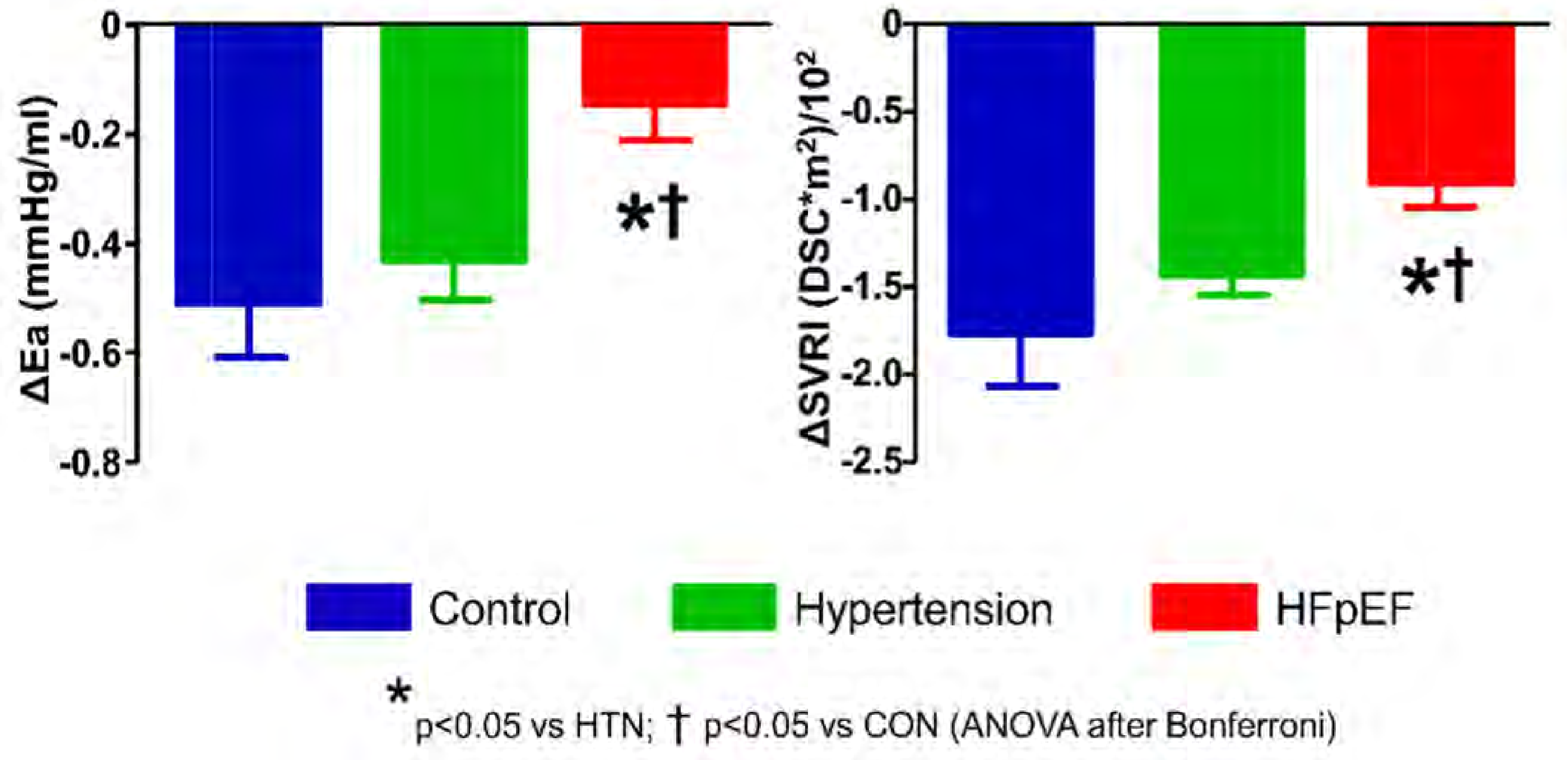
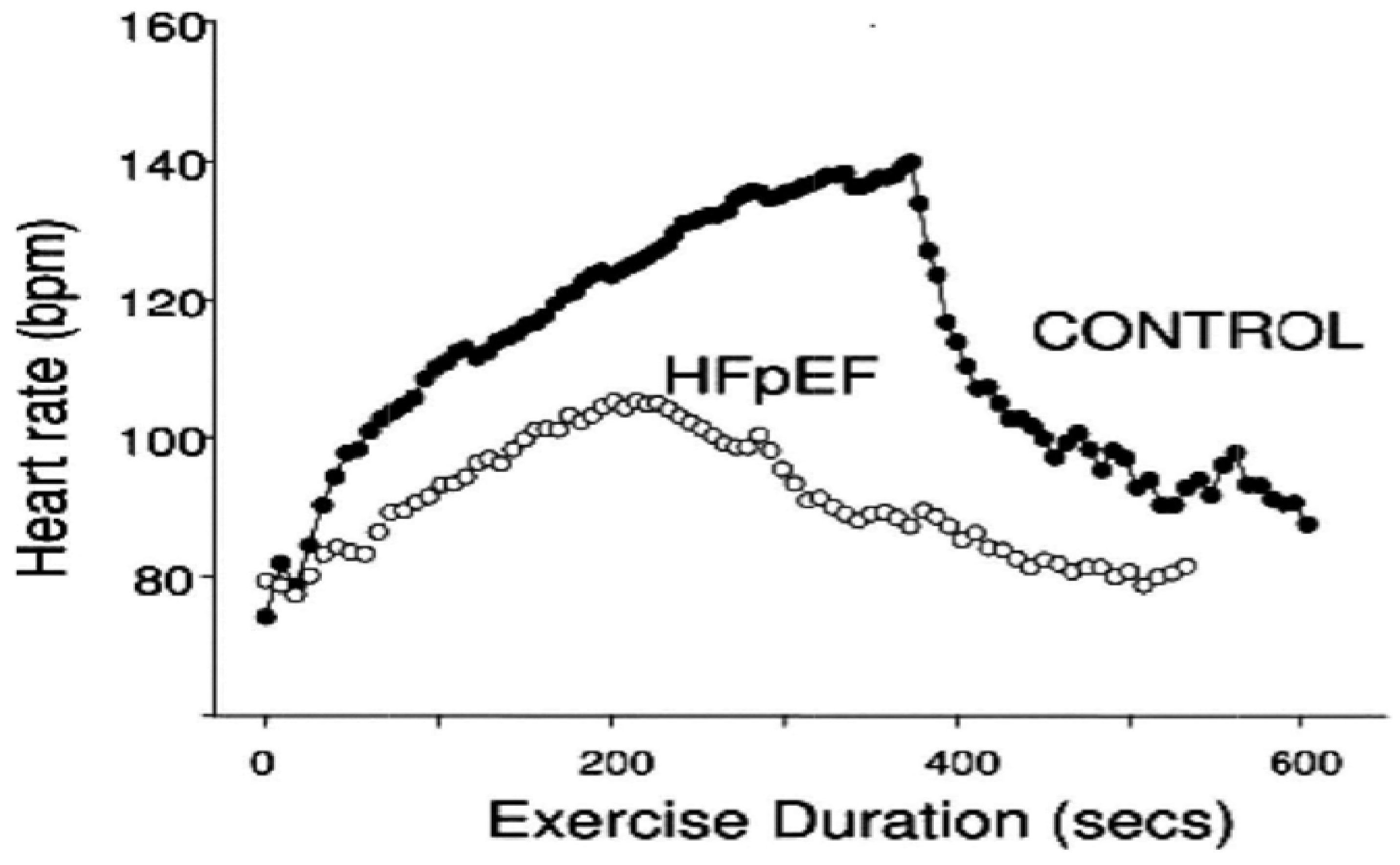
Impaired Peripheral Vascular Vasodilatory Reserve



Vasodilatation at matched low-level exercise

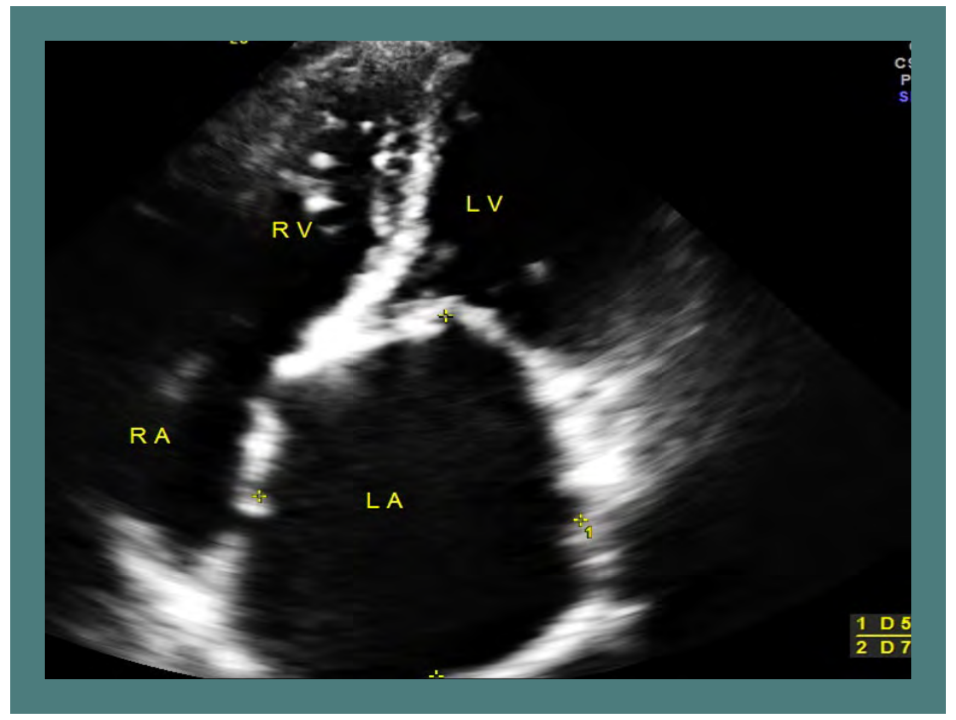
Chronotropic Incompetence



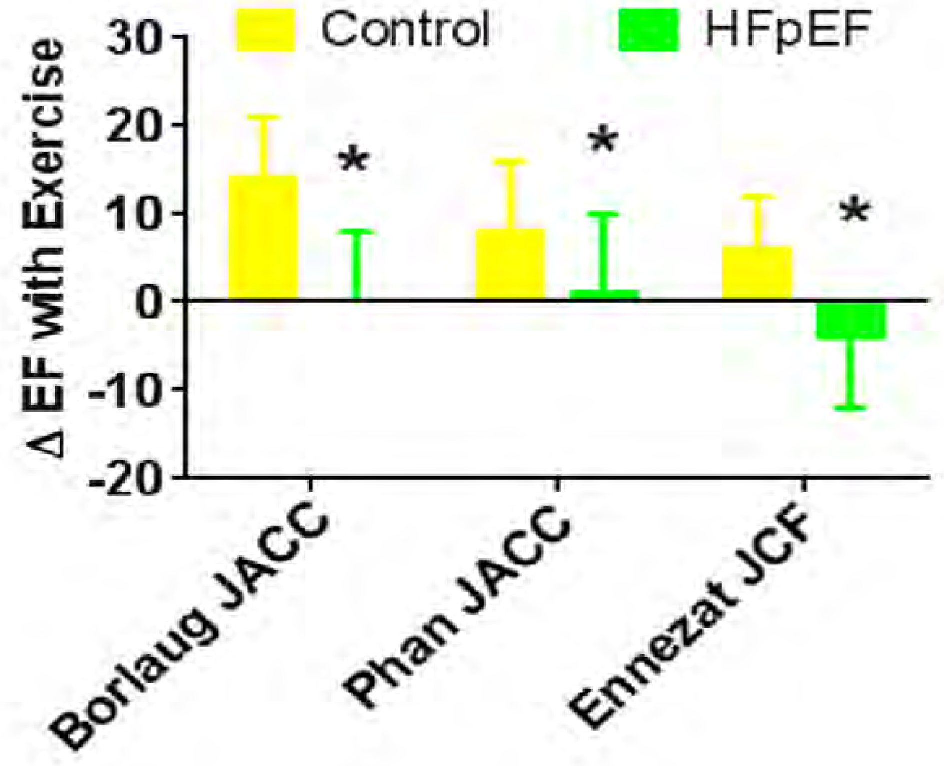
Pulmonary Hypertension

PA pressure > 40 mmHg

RV Enlargement and Dysfunction



Decreased Systolic Reserve



Borlaug, Circ 2006, Brubaker, Circ 2011; Borlaug et al, JACC, 2010,

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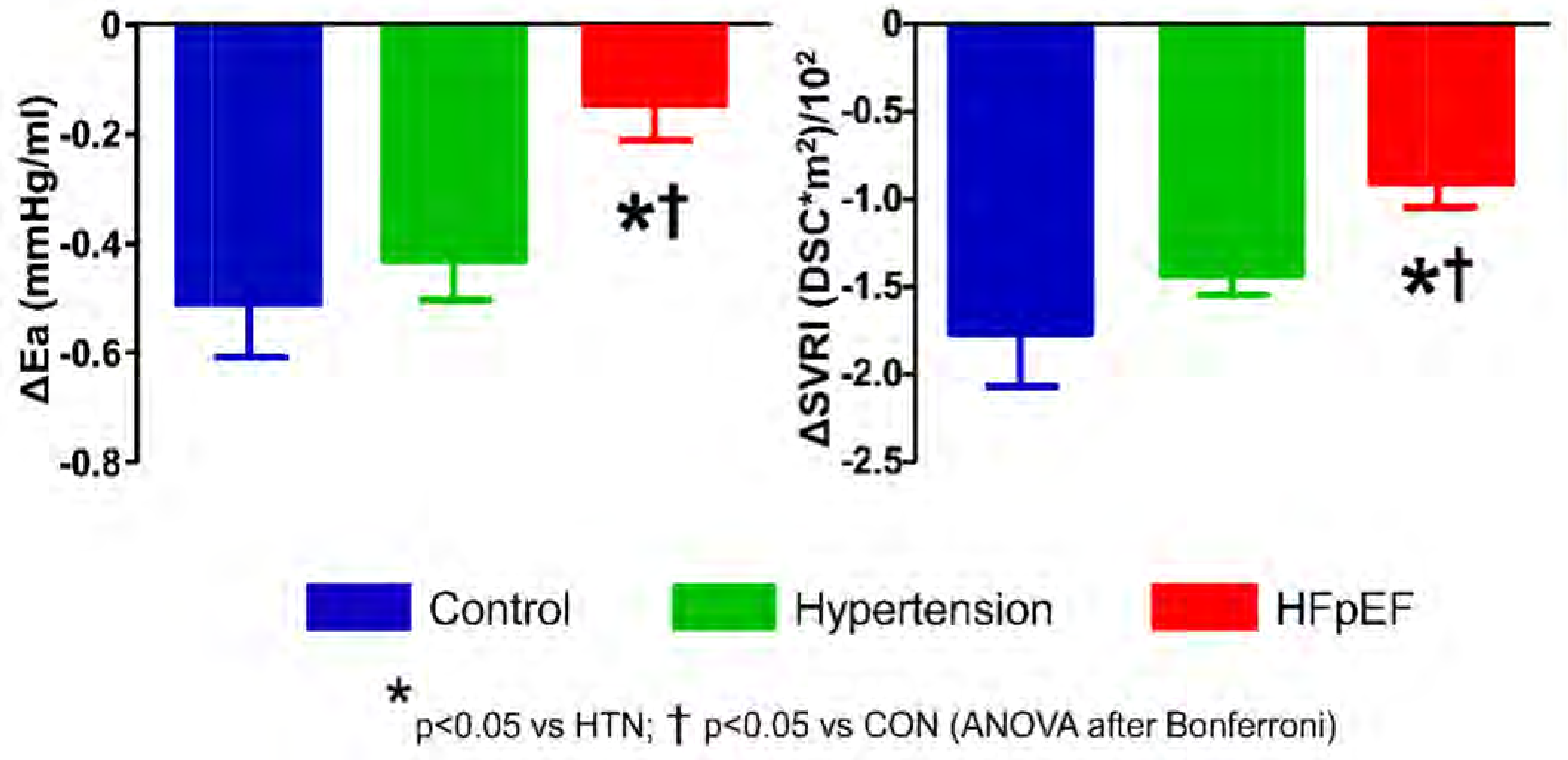
HFpEF - NOT Just the Left Ventricle

Impaired Peripheral Vascular Vasodilatory Reserve



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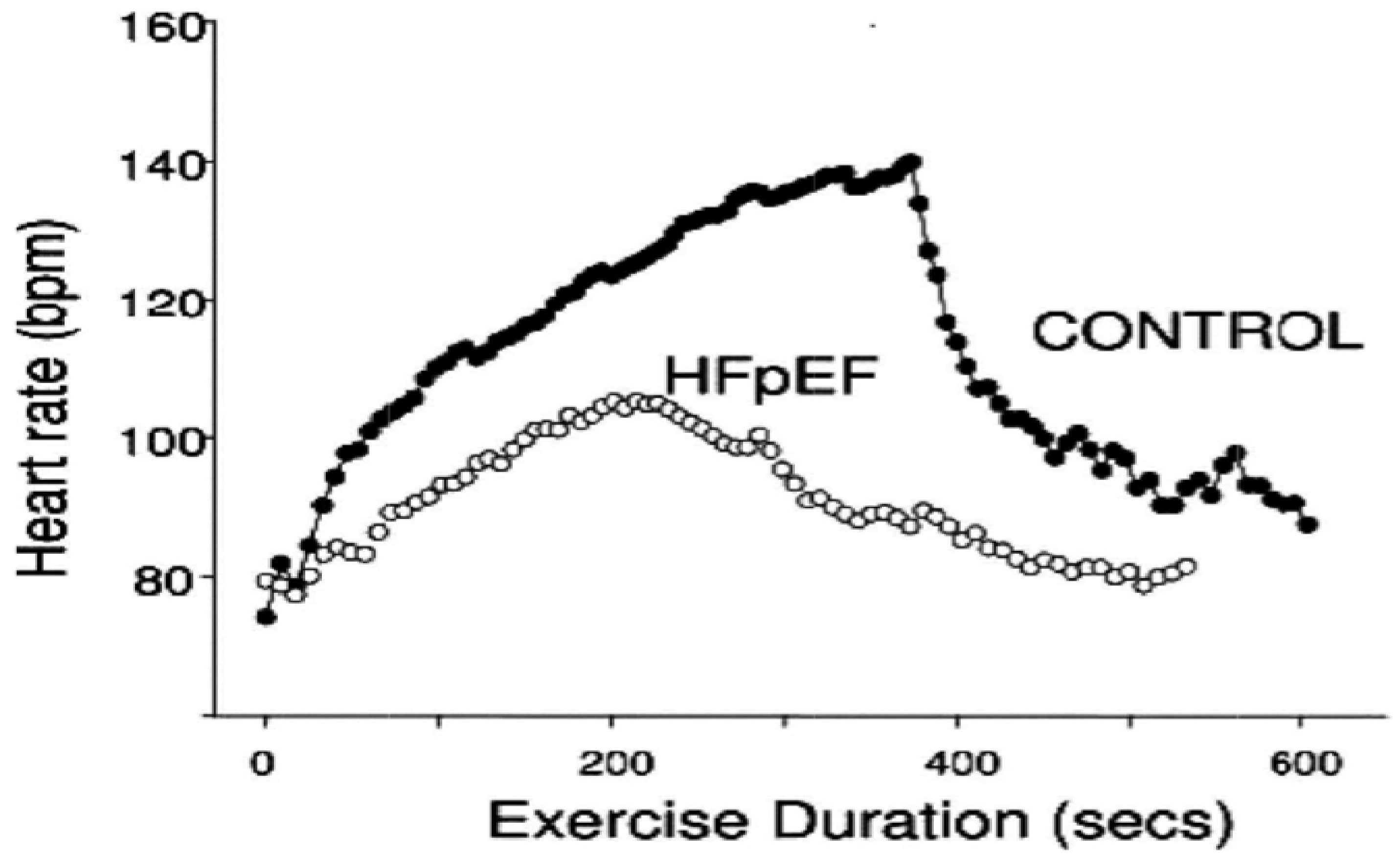

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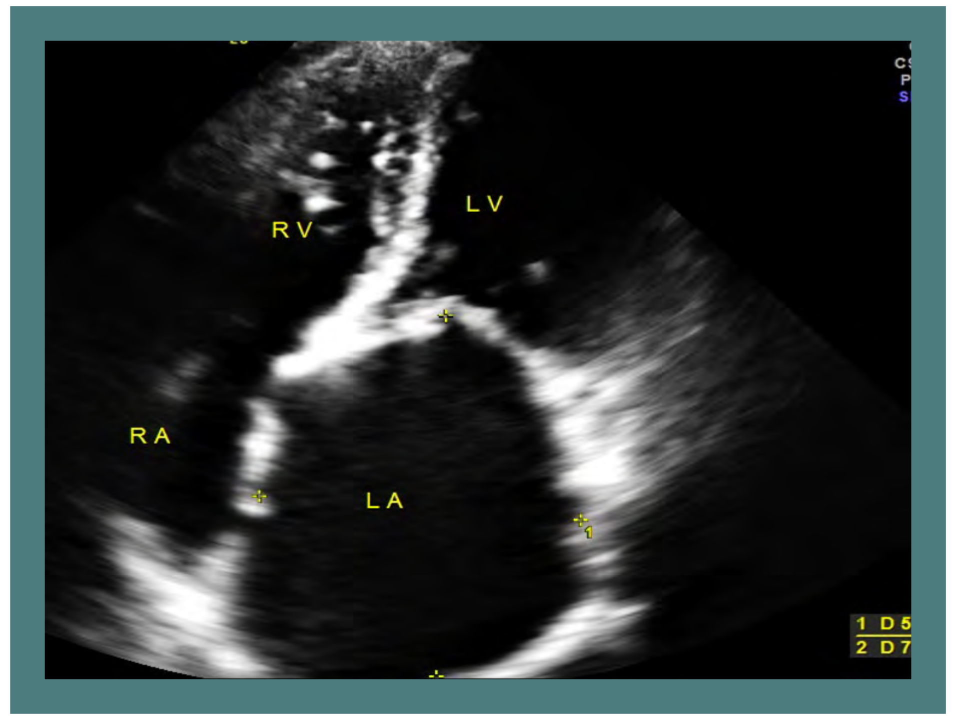

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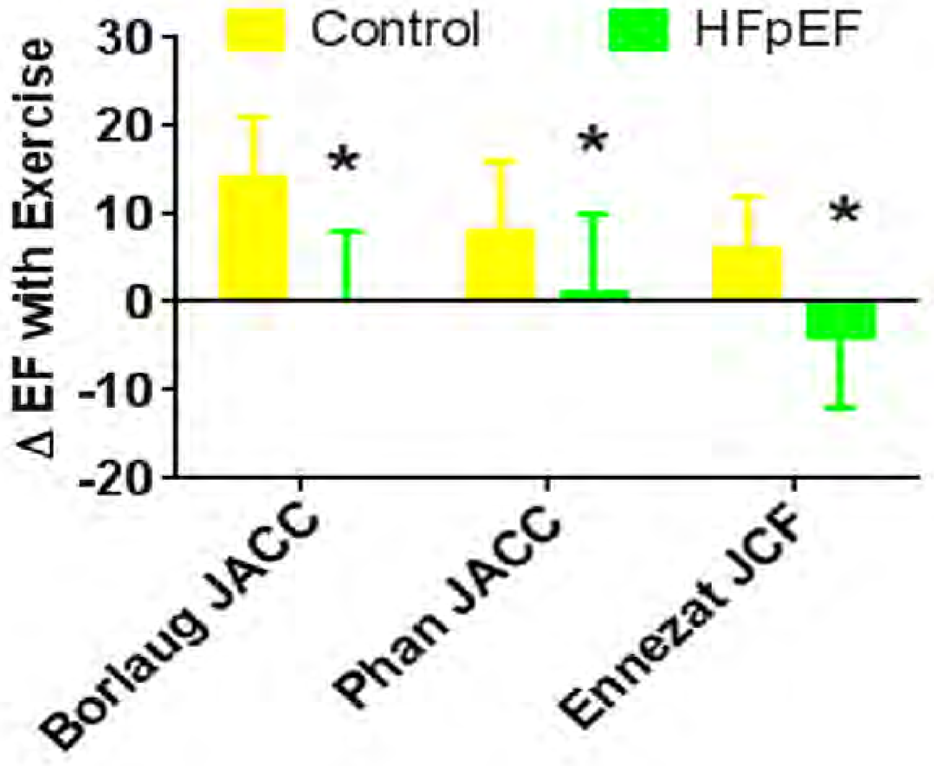


Borlaug, Circ 2006, Brubaker, Circ 2011; Borlaug et al, JACC, 2010,

HFpEF – Elevations in PCWP During Exercise

Tufts Medical Center

Exercise Hemodynamics Enhance Diagnosis of Early Heart Failure With Preserved Ejection Fraction

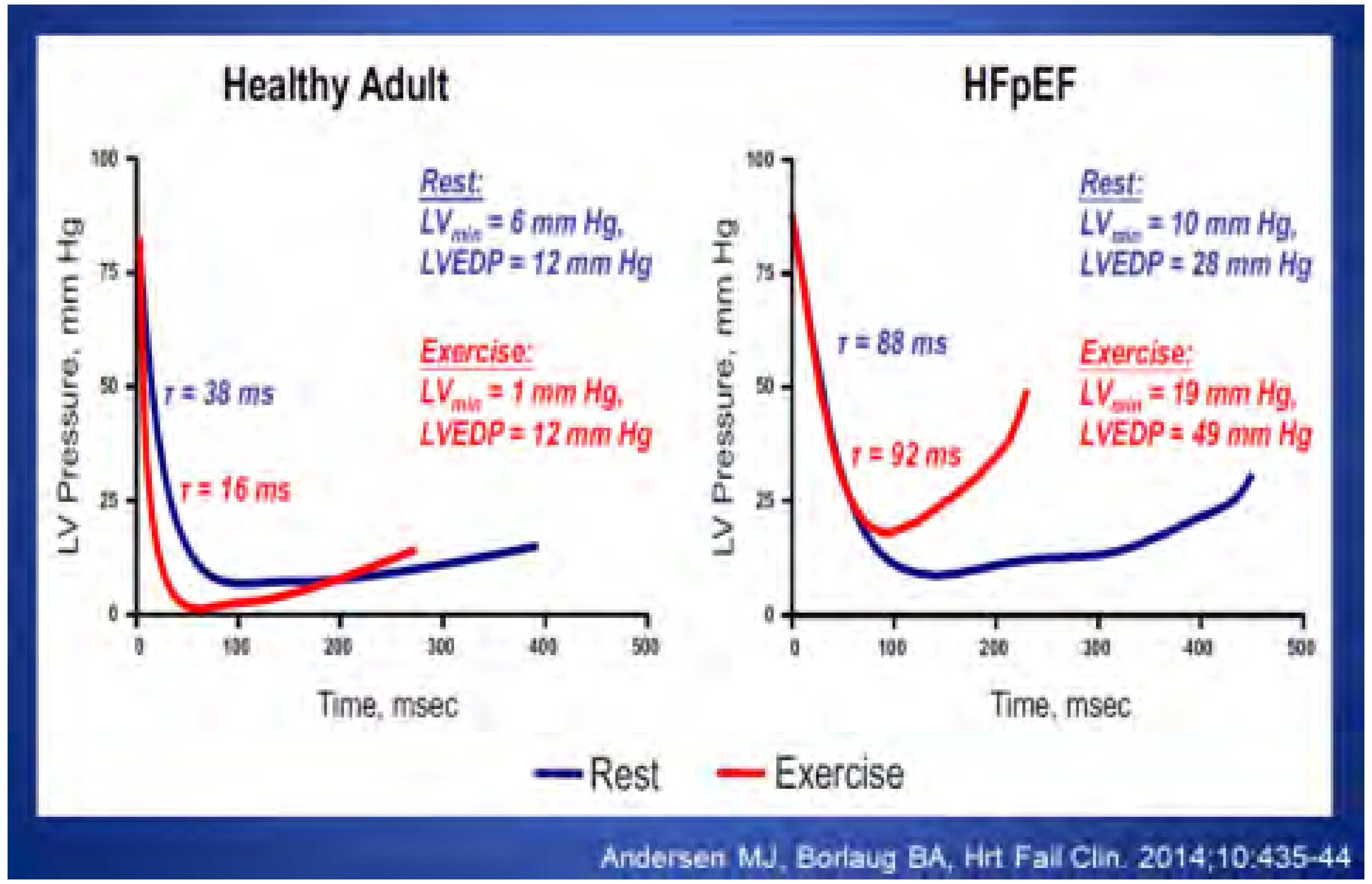
Barry A. Borlaug, MD; Rick A. Nishimura, MD; Paul Sorajja, MD; Carolyn S.P. Lam, MBBS; Margaret M. Redfield, MD

Background—When advanced, heart failure with preserved ejection fraction (HFpEF) is readily apparent. However, diagnosis of earlier disease may be challenging because exertional dyspnea is not specific for heart failure, and biomarkers and hemodynamic indicators of volume overload may be absent at rest.

Methods and Results—Patients with exertional dyspnea and ejection fraction >50% were referred for hemodynamic catheterization. Those with no significant coronary disease, normal brain natriuretic peptide assay, and normal resting hemodynamics (mean pulmonary artery pressure <25 mm Hg and pulmonary capillary wedge pressure [PCWP] <15 mm Hg) (n=55) underwent exercise study. The exercise PCWP was used to classify patients as having HFpEF (PCWP ≥25 mm Hg) (n=32) or noncardiac dyspnea (PCWP <25 mm Hg) (n=23). At rest, patients with HFpEF had higher resting pulmonary artery pressure and PCWP, although all values fell within normal limits. Exercise-induced elevation in PCWP in HFpEF was confirmed by greater increases in left ventricular end-diastolic pressure and was associated with blunted increases in heart rate, systemic vasodilation, and cardiac output. Exercise-induced pulmonary hypertension was present in 88% of patients with HFpEF and was related principally to elevated PCWP, as pulmonary vascular resistances dropped similarly in both groups. Exercise PCWP and pulmonary artery systolic pressure were highly correlated. An exercise pulmonary artery systolic pressure ≥45 mm Hg identified HFpEF with 96% sensitivity and 95% specificity.

Conclusions—Euvolemic patients with exertional dyspnea, normal brain natriuretic peptide, and normal cardiac filling pressures at rest may have markedly abnormal hemodynamic responses during exercise, suggesting that chronic symptoms are related to heart failure. Earlier and more accurate diagnosis using exercise hemodynamics may allow better targeting of interventions to treat and prevent HFpEF progression. **(*Circ Heart Fail*. 2010;3:588-595.)**

Key Words: heart failure ■ exercise ■ hemodynamics ■ diastole ■ diagnosis



Mechanisms of Dyspnea in HFpEF – Not Just Volume Overload*

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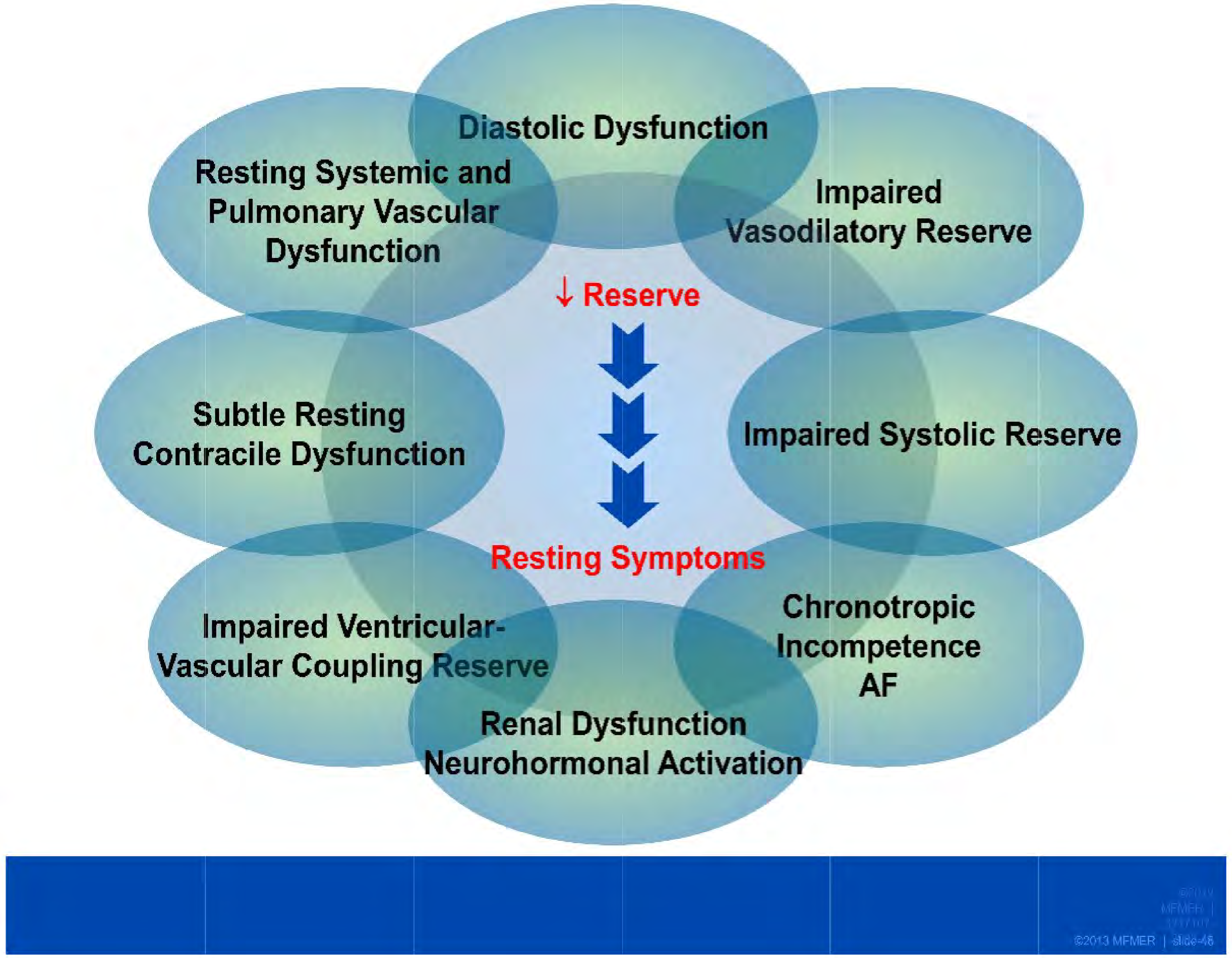
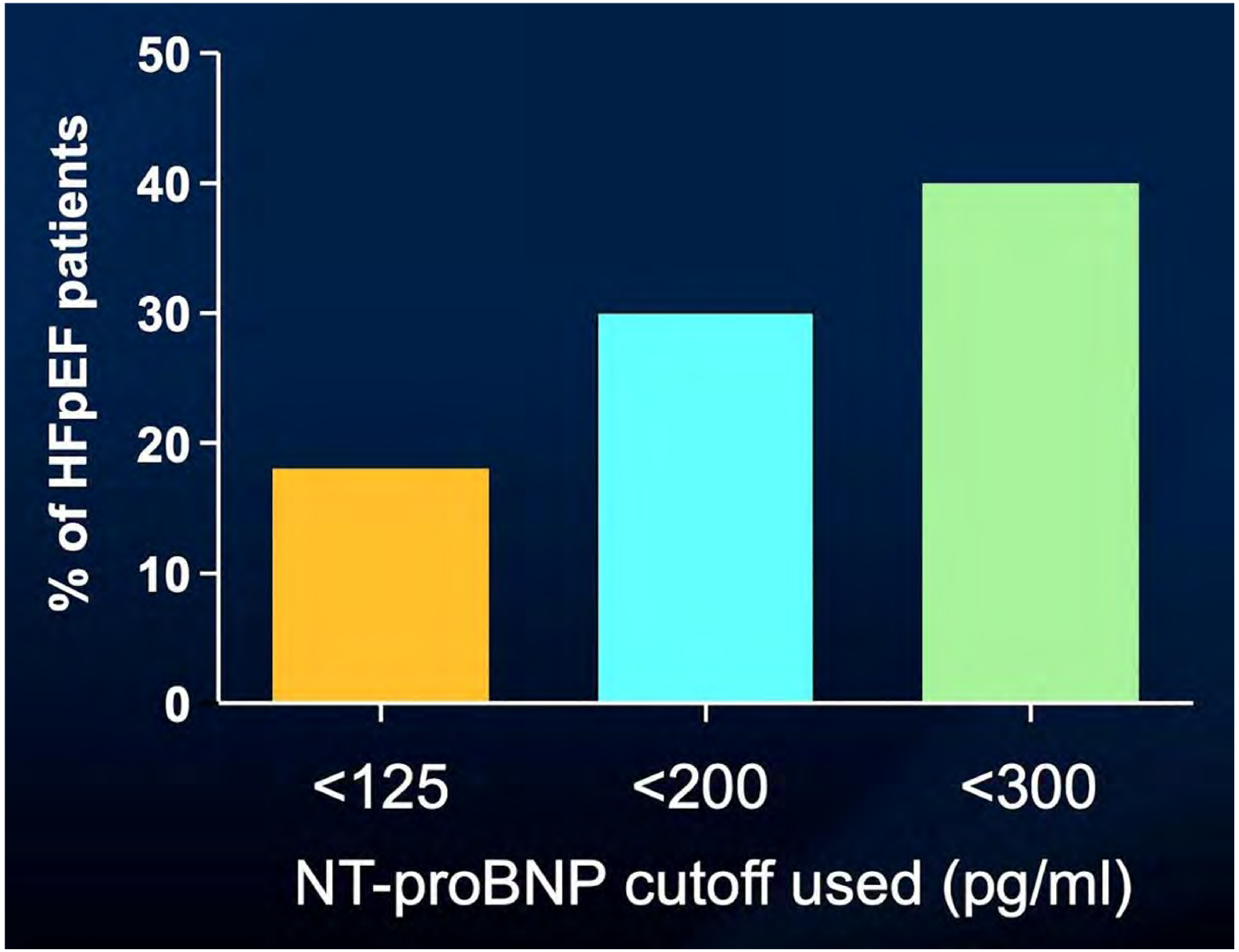
- Chronotropic incompetence
- Impaired vasodilation
- Increased left-sided filling pressures from either venoconstriction or diastolic dysfunction,
- Peripheral muscular changes
- Endothelial dysfunction

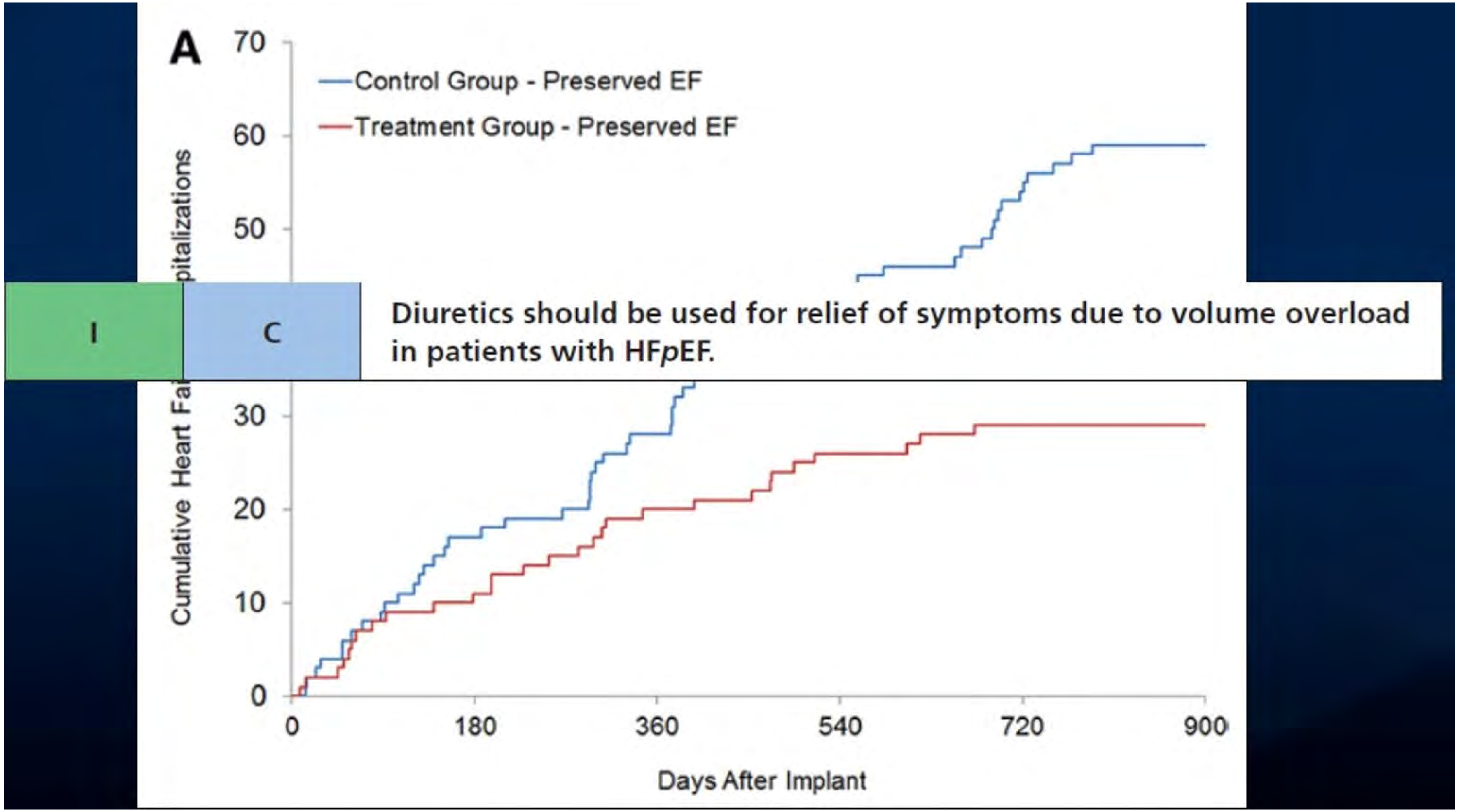


Normal NT-proBNP Does NOT Exclude HFpEF



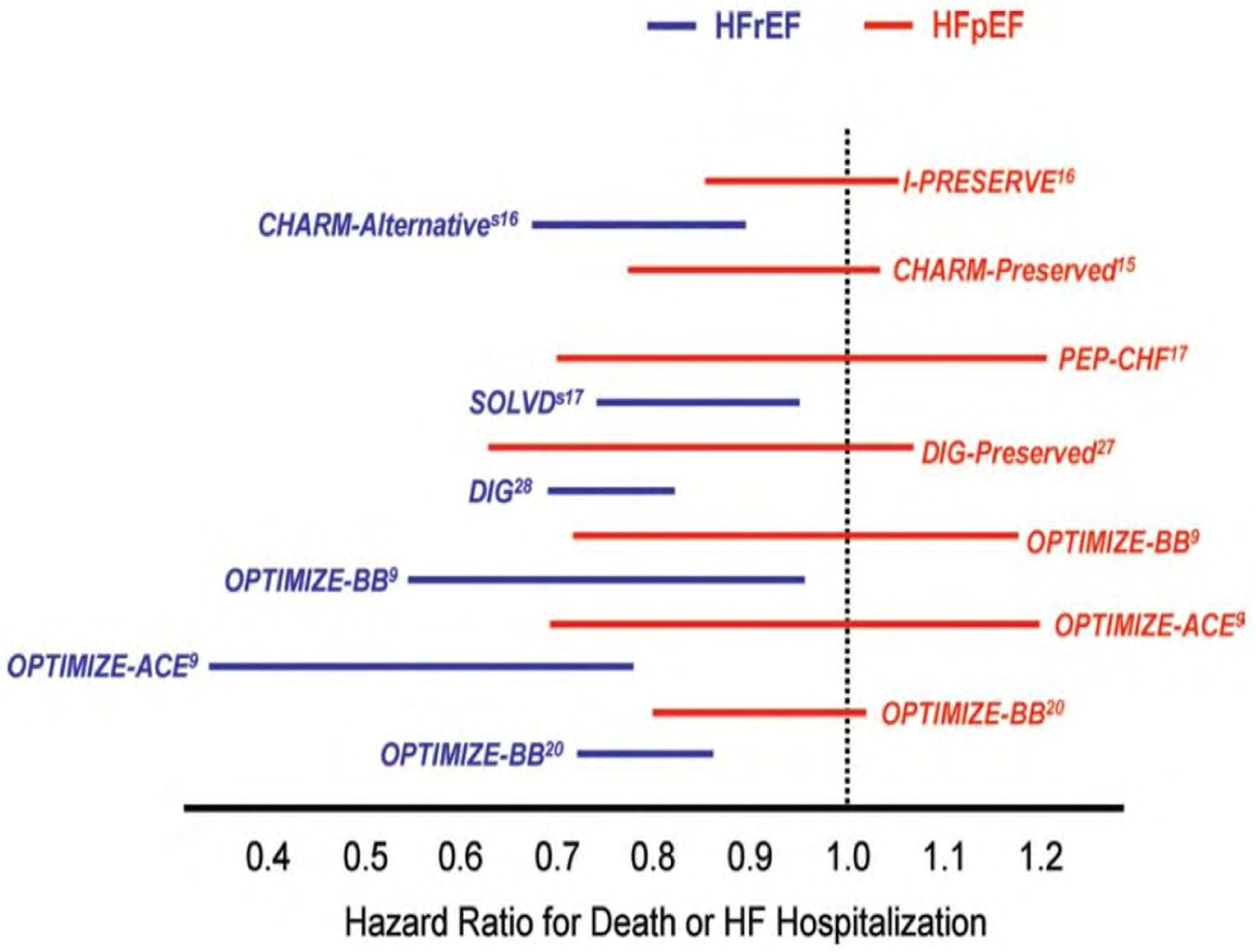
30% of HFPEF patients have Normal BNP Levels

HFpEF Management - #1 Diuretics Work



I	C	Diuretics should be used for relief of symptoms due to volume overload in patients with HF*p*EF.

HFpEF Management - #2 Neurohormonal Antagonists Don't Really Work Well

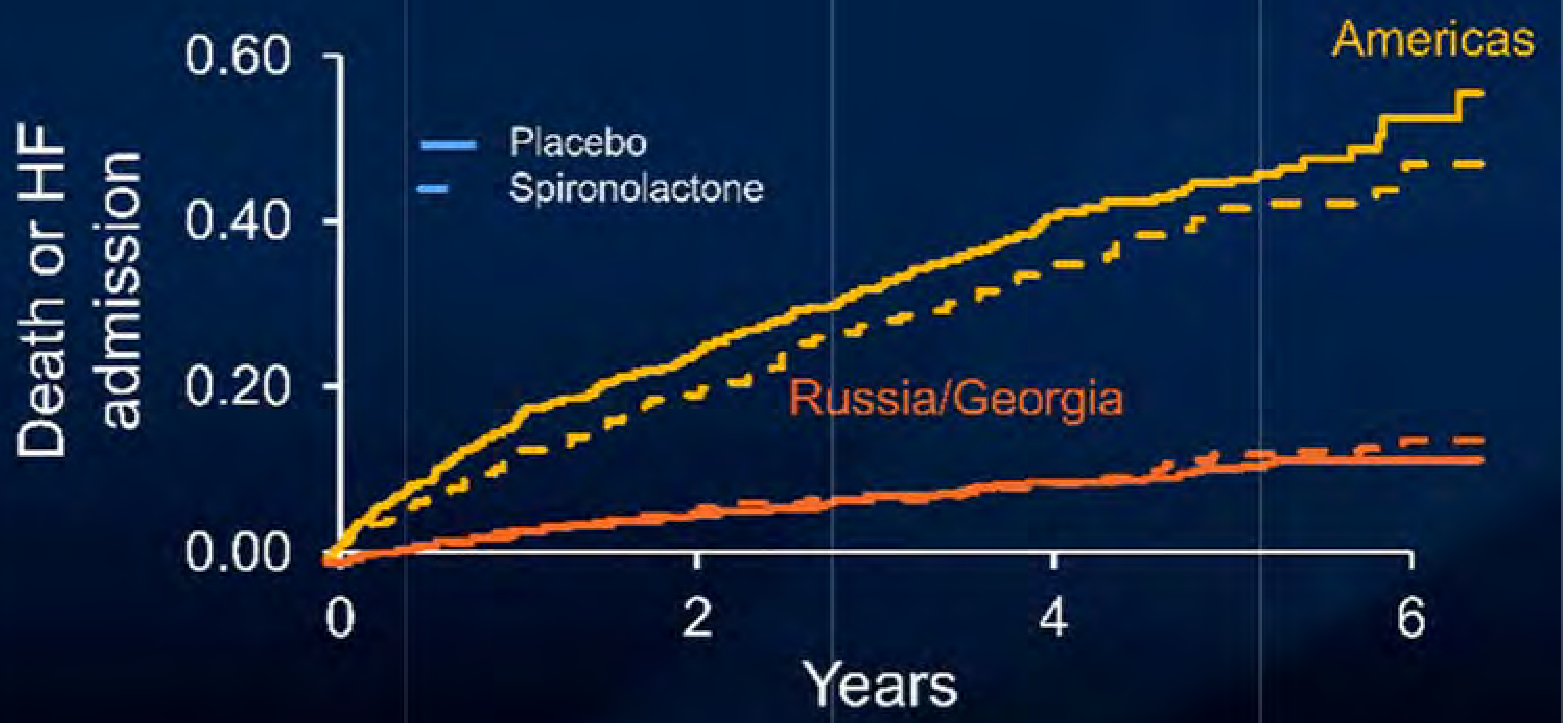


Acronym	Agent	N	Mortality
CHARM-PRE	candesartan	3023	No effect
I-PRESERVE	irbesartan	4128	No effect
PEP-CHF	perindopril	850	No effect
SENIORS	nebivolol	2128	No effect
TOPCAT	spironolactone	3445	No effect

Borlaug & Redfield Circulation. 2011

Negative Trials in HFpEF

- RELAX – sildenafil
- NEAT HF – Isosorbide mononitrate
- CHARM, I-PRESERVE – ACE / ARBs
- TOPCAT – spironolactone



PARAGON – HF - Sacubitril/Valsartan Was Not Effective in HFpEF

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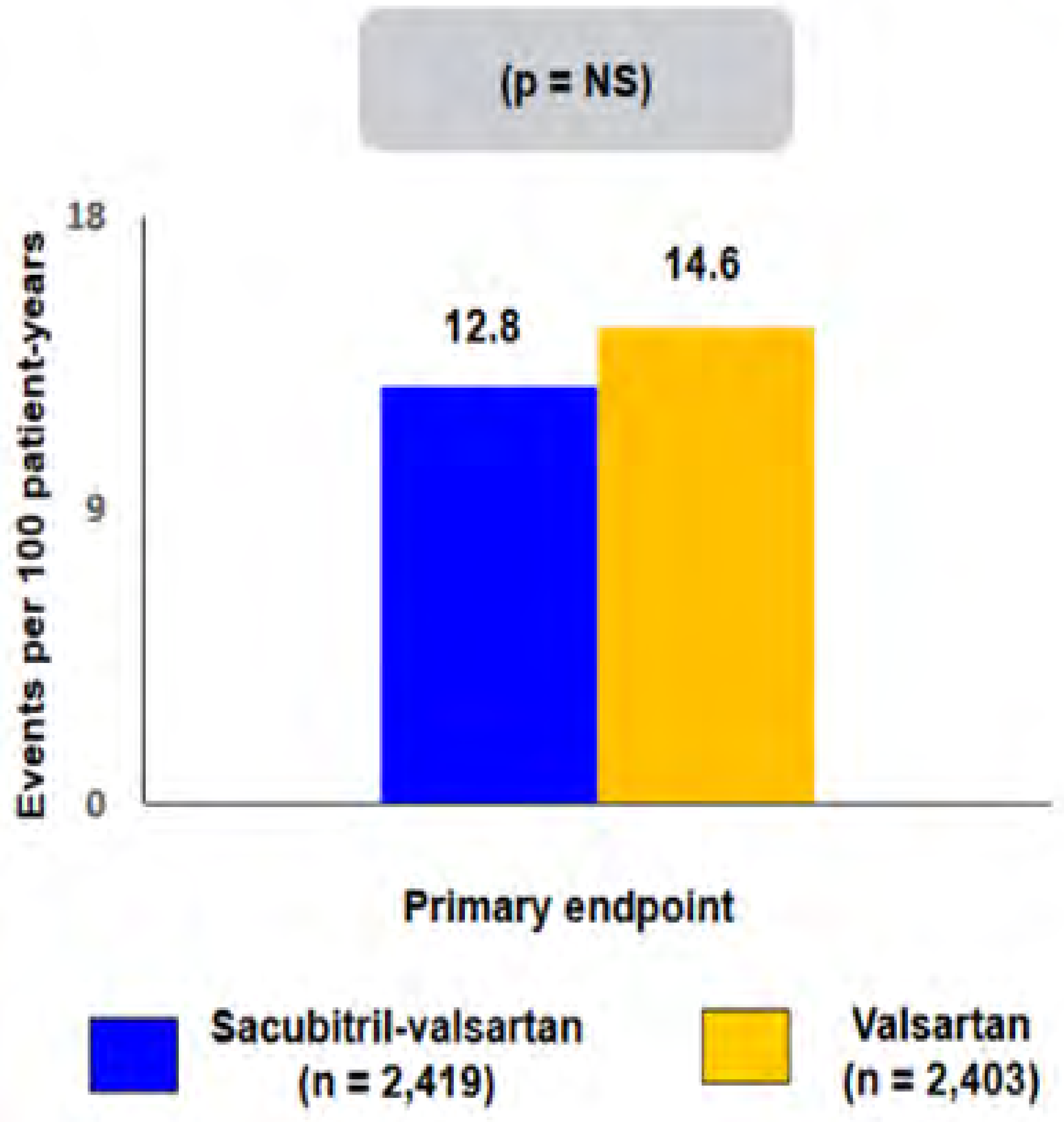
Trial Description: Patients with heart failure with preserved ejection fraction were randomized to sacubitril-valsartan 97/103 mg twice daily versus valsartan 160 mg twice daily.



RESULTS

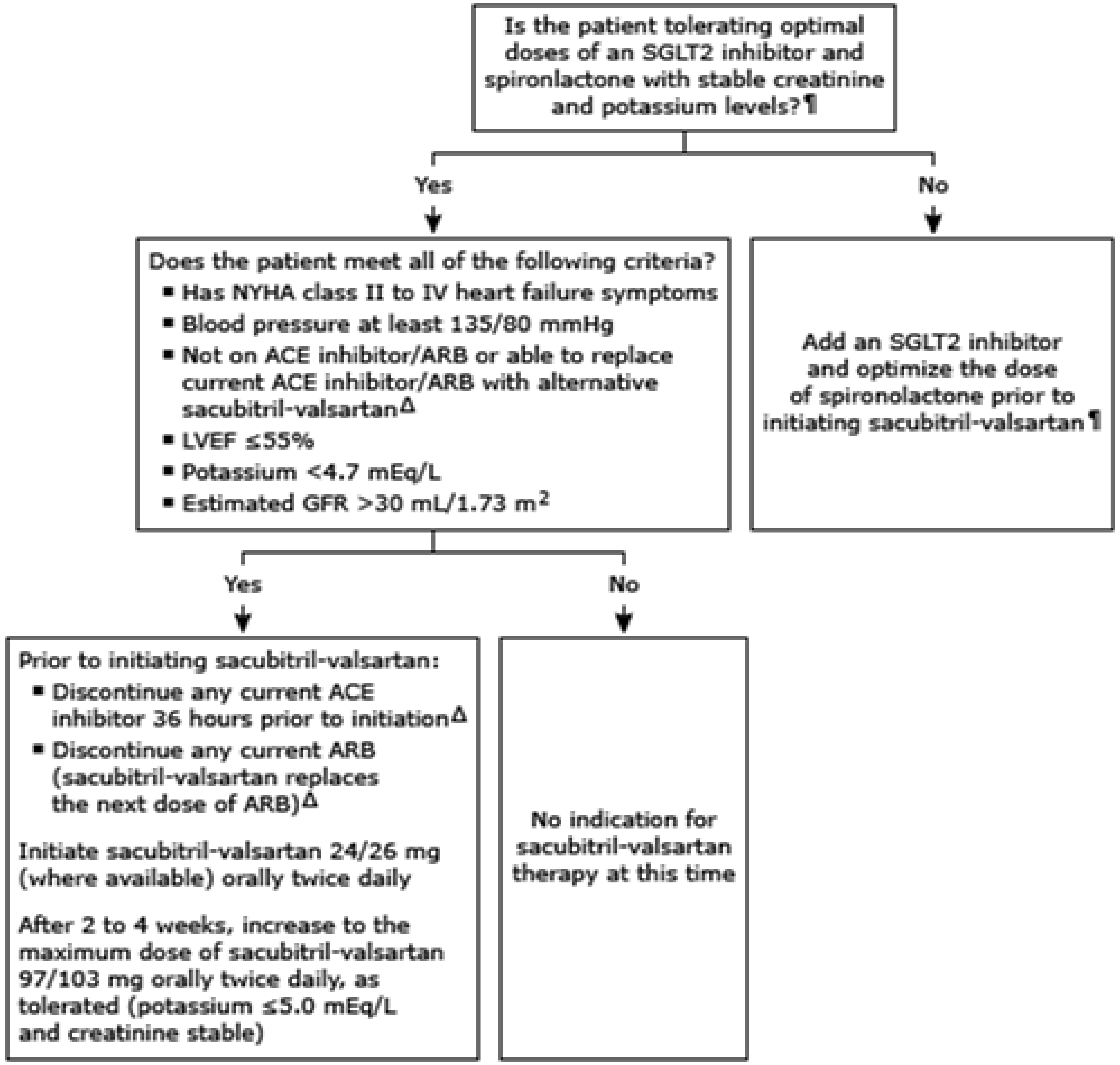
- Primary efficacy endpoint: rate of cardiovascular deaths or hospitalizations for heart failure was 12.8 events per 100 patient-years in the sacubitril-valsartan group vs. 14.6 events per 100 patient-years in the valsartan group (p = NS)
- NYHA class improvement: 15.0% in the sacubitril-valsartan group vs. 12.6% in the valsartan group ($p < 0.05$)

CONCLUSIONS

- Among patients with heart failure with preserved ejection fraction, sacubitril-valsartan was not effective at reducing the incidence of cardiovascular death or hospitalization for heart failure compared with valsartan

Solomon SD, et al. N Engl J Med 2019;Sep 1:[Epub]

Initiating Sacubitril-Valsartan in Adults with HF with Preserved Ejection Fraction*



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EMPEROR-Preserved - Study Design

Phase III randomised double-blind placebo-controlled trial

Aim: to evaluate efficacy and safety of empagliflozin versus placebo, on top of standard of care, in **patients with HFpEF** with or without diabetes

Population: T2DM & non-T2DM, aged ≥18 years, chronic HF (NYHA class II–IV), eGFR≥20

EMPEROR-Preserved
LVEF >40%

5988 patients

Patients with structural heart disease or HHF within 12 months of screening

Empagliflozin 10 mg once daily
+ standard of care

Placebo once daily
+ standard of care

Median follow-up = 26 months

COMPOSITE PRIMARY ENDPOINT

Time to first event of adjudicated cardiovascular death or adjudicated HHF

SECONDARY ENDPOINTS

- First and recurrent adjudicated HF hospitalisation events
- Slope of change in eGFR (CKD-EPI)

Anker S, Butler J, et al. Eur J Heart Fail. 2019;21:2179-87.

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Primary Endpoint - Composite of Cardiovascular Death or Heart Failure Hospitalization

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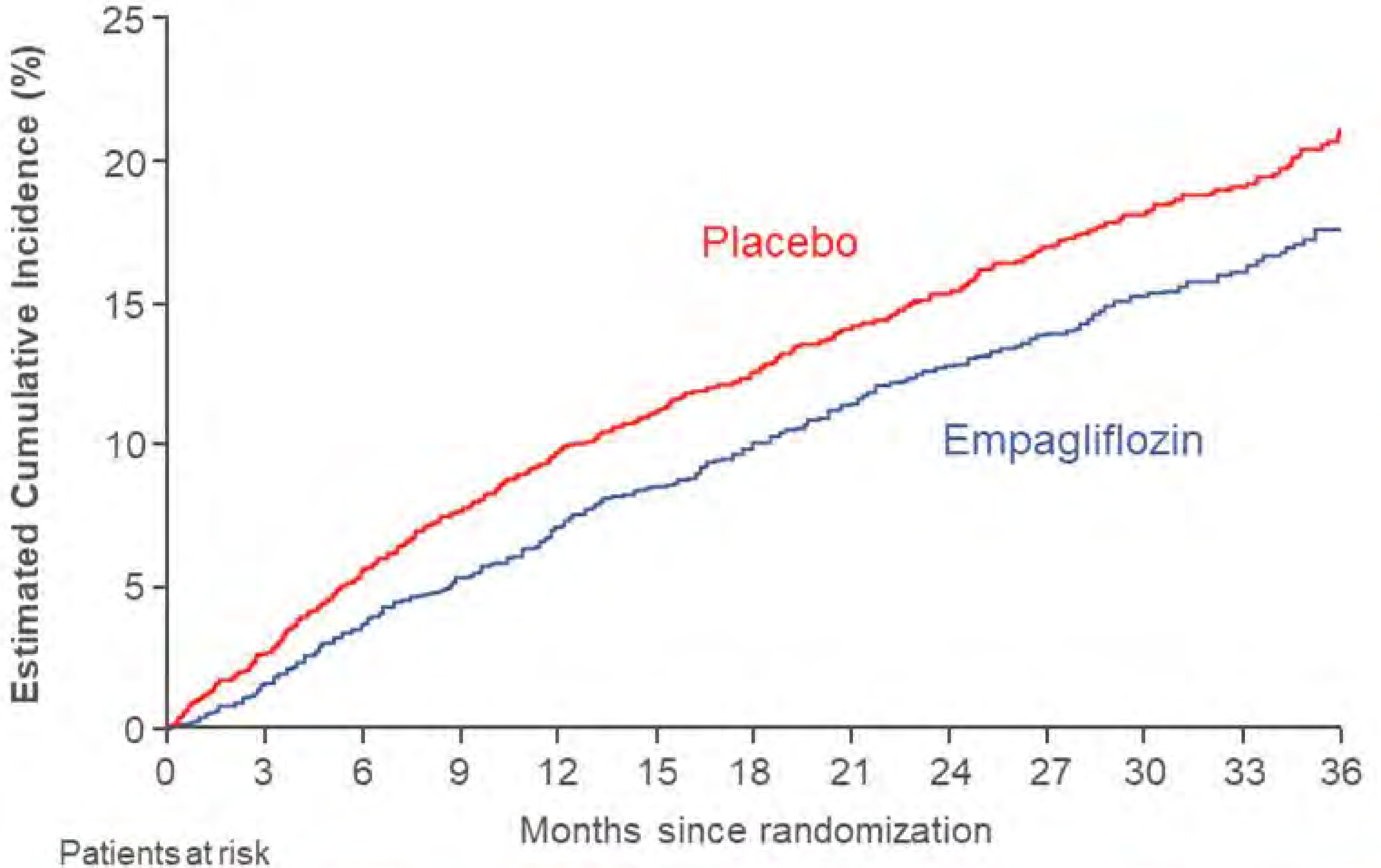

Patients at risk

Placebo	2991	2786	2627	2066	1534	961	400
Empagliflozin	2997	2843	2708	2134	1578	1005	402

HR 0.79
(95% CI 0.69, 0.90)
P = 0.0003

Placebo:
511 patients with event
Rate: 8.7 per 100 patient-years

Empagliflozin:
415 patients with event
Rate: 6.9 per 100 patient-years

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Anker S, Butler J, et al. N Engl J Med. 2021;385:1451-61.

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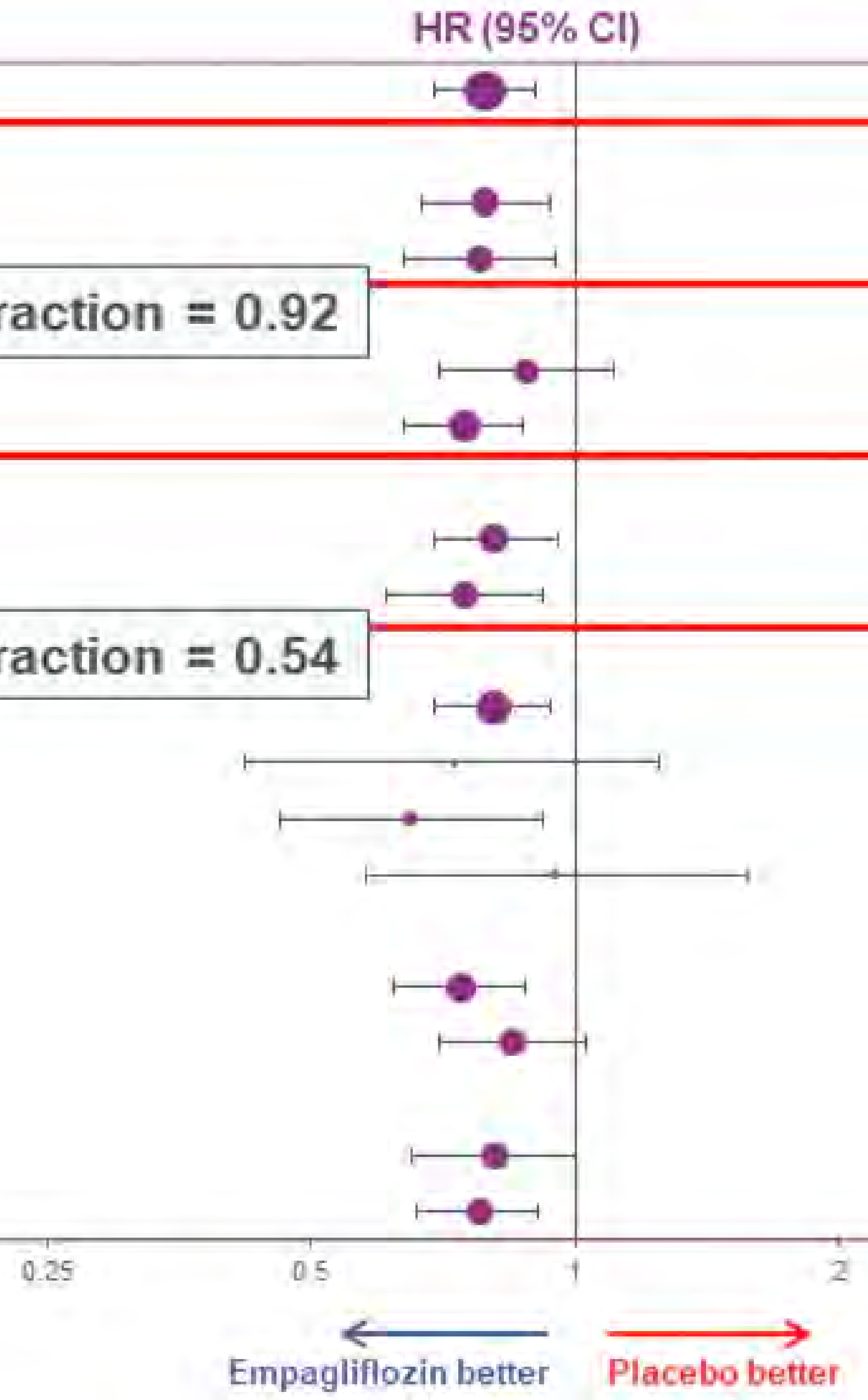
Primary Endpoint: Effects in Subgroups (1 of 2)

	Empagliflozin	Placebo	HR (95% CI)
	n with event/N analysed		
Overall	415/2997	511/2991	0.79 (0.69–0.90)
Baseline diabetes status			
Diabetes	239/1466	291/1472	0.79 (0.67–0.94)
No diabetes	176/1531	220/1519	0.78 (0.64–0.95)
Age, years			
<70	134/1066	152/1084	0.88 (0.70–1.11)
≥70	281/1931	359/1907	0.75 (0.64–0.87)
Sex			
Male	253/1659	297/1653	0.81 (0.69–0.96)
Female	162/1338	214/1338	0.75 (0.61–0.92)
Race			
White	310/2286	370/2256	0.81 (0.69–0.94)
Black	24/133	28/125	0.73 (0.42–1.25)
Asian	54/413	77/411	0.65 (0.46–0.92)
Other	27/164	36/198	0.95 (0.58–1.57)
Baseline body-mass index			
<30 kg/m²	223/1654	292/1642	0.74 (0.62–0.88)
≥30 kg/m²	192/1343	219/1349	0.85 (0.70–1.03)
Baseline eGFR (CKD-EPI)			
≥60 mL/min/1.73 m²	152/1493	189/1505	0.81 (0.65–1.00)
<60 mL/min/1.73 m²	263/1504	321/1484	0.78 (0.66–0.91)

P-interaction = 0.92

P-interaction = 0.54



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Anker S, Butler J, et al. N Engl J Med. 2021;385:1451-61.

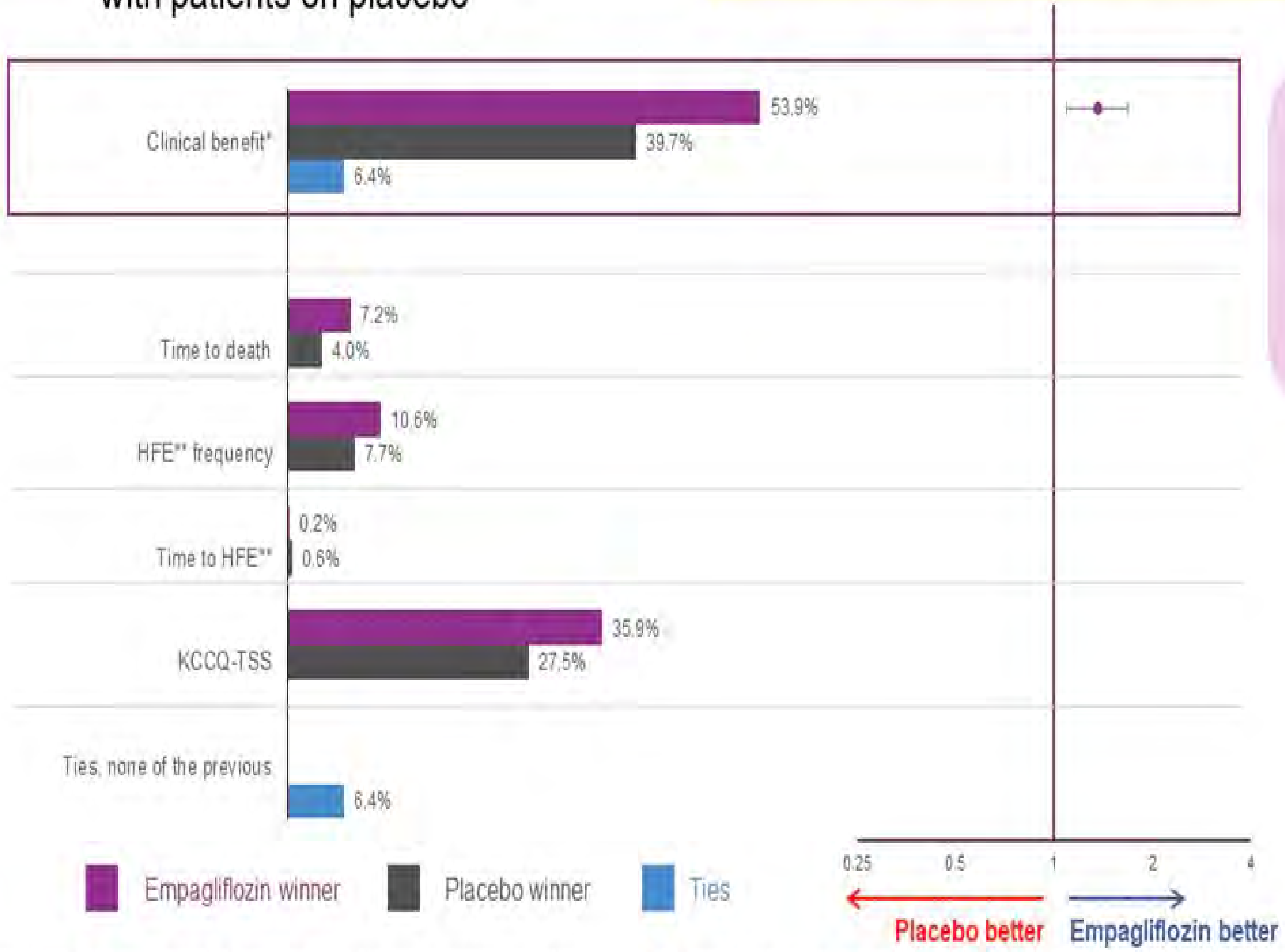
SGLT2 Inhibitors in Acute HF - EMPULSE

Empluse - Key Inclusion Criteria

- Hospitalized with primary diagnosis of acute HF (de novo or decompensated chronic HF), regardless of ejection fraction or diabetes status
- Randomization ≥24 hours and ≤5 days after admission (post-stabilization and still in hospital)
- Stabilization criteria (in hospital):
  - Systolic blood pressure ≥100 mmHg and no symptoms of hypotension within 6 hours
  - No increase in intravenous (IV) diuretic dose within 6 hours
  - No IV vasodilators including nitrates within 6 hours
  - No IV inotropic drugs within 24 hours
- NT-proBNP ≥1600 pg/mL or BNP ≥400 pg/mL (50% more for patients with atrial fibrillation) during index hospitalization or within 72 hours pre-admission

Primary Endpoint

- Patients treated with empagliflozin were 36% more likely to experience a clinical benefit* compared with patients on placebo



Stratified win ratio: 1.36
(95% CI: 1.09, 1.68)
p=0.0054

Death:
Empagliflozin: 4.2%
Placebo: 8.3%

HF event:
Empagliflozin 10.6%
Placebo 14.7%

Numbers reflect percentage of comparisons. For the components of the win ratio these numbers do not reflect randomized comparisons. *Composite of death, number of HFEs, time to first HFE and change from baseline in KCCQ-TSS after 90 days of treatment. **HFE includes hospitalizations for heart failure, urgent heart failure visits, and unplanned outpatient visits.

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Voors AA, et al. Presented at AHA Scientific Sessions 2021.

SGLT2 Inhibitors in Acute HF - EMPULSE

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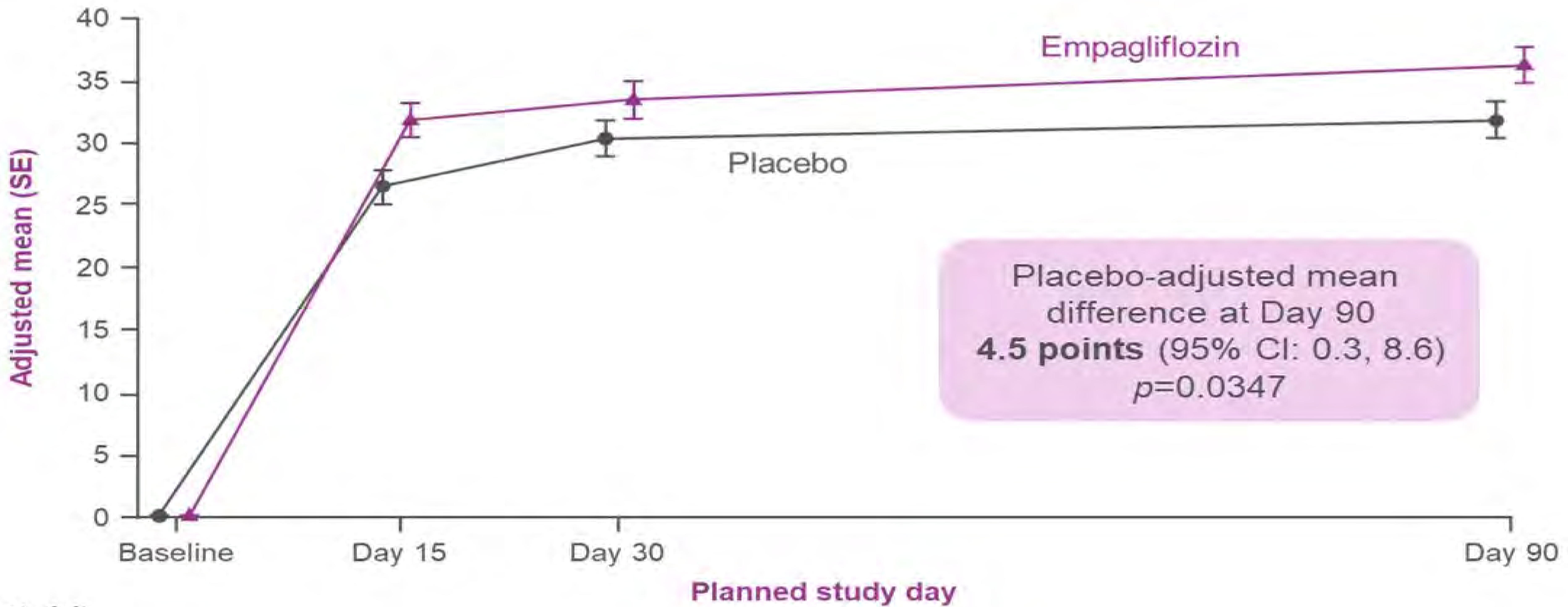
Secondary Endpoint: Change in KCCQ-TSS at Day 90



No. with data at visit				
Placebo	250	240	234	221
Empagliflozin	245	233	237	230

CI, confidence interval; KCCQ-TSS, Kansas City Cardiomyopathy Questionnaire total symptom score.

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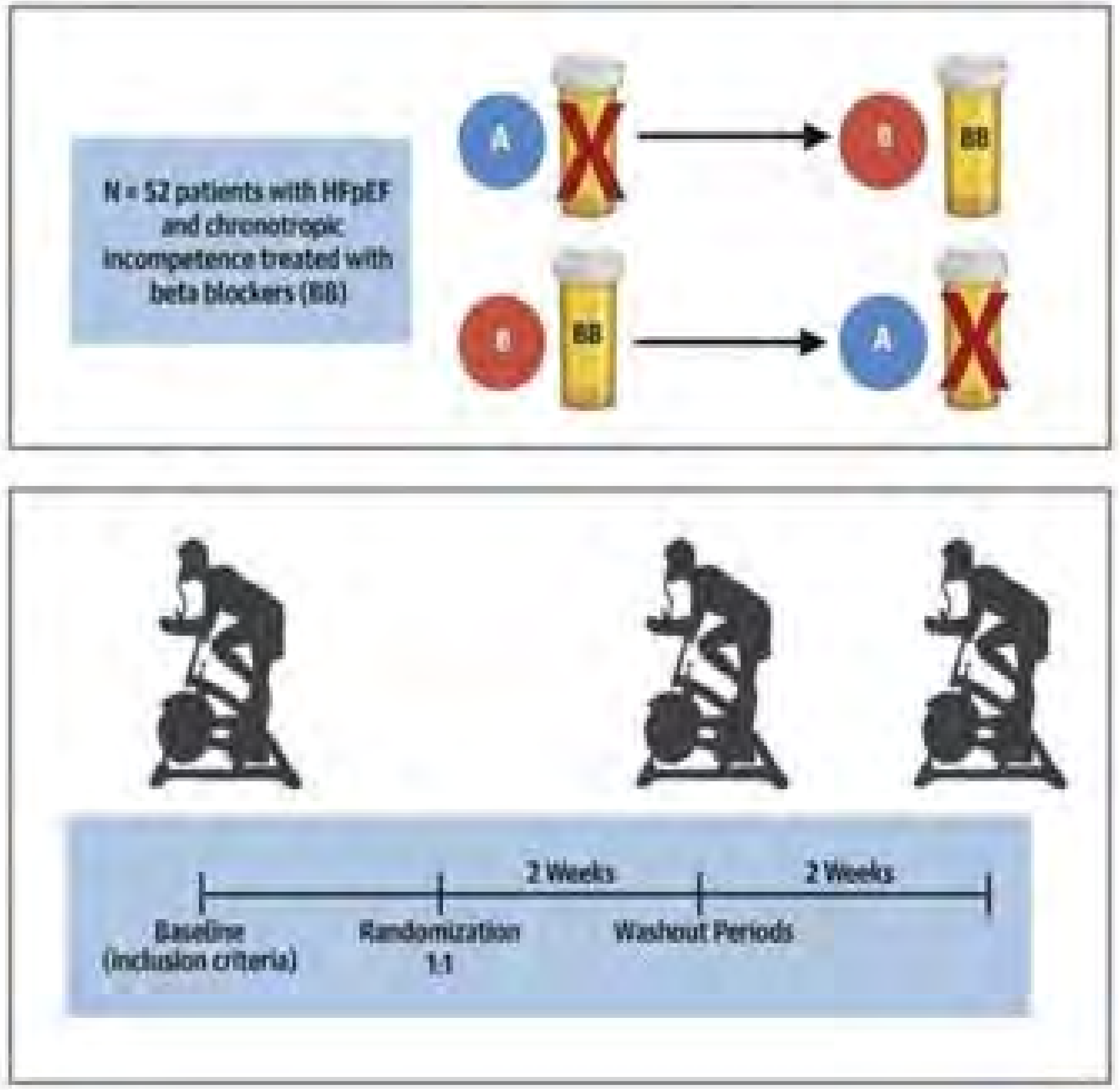
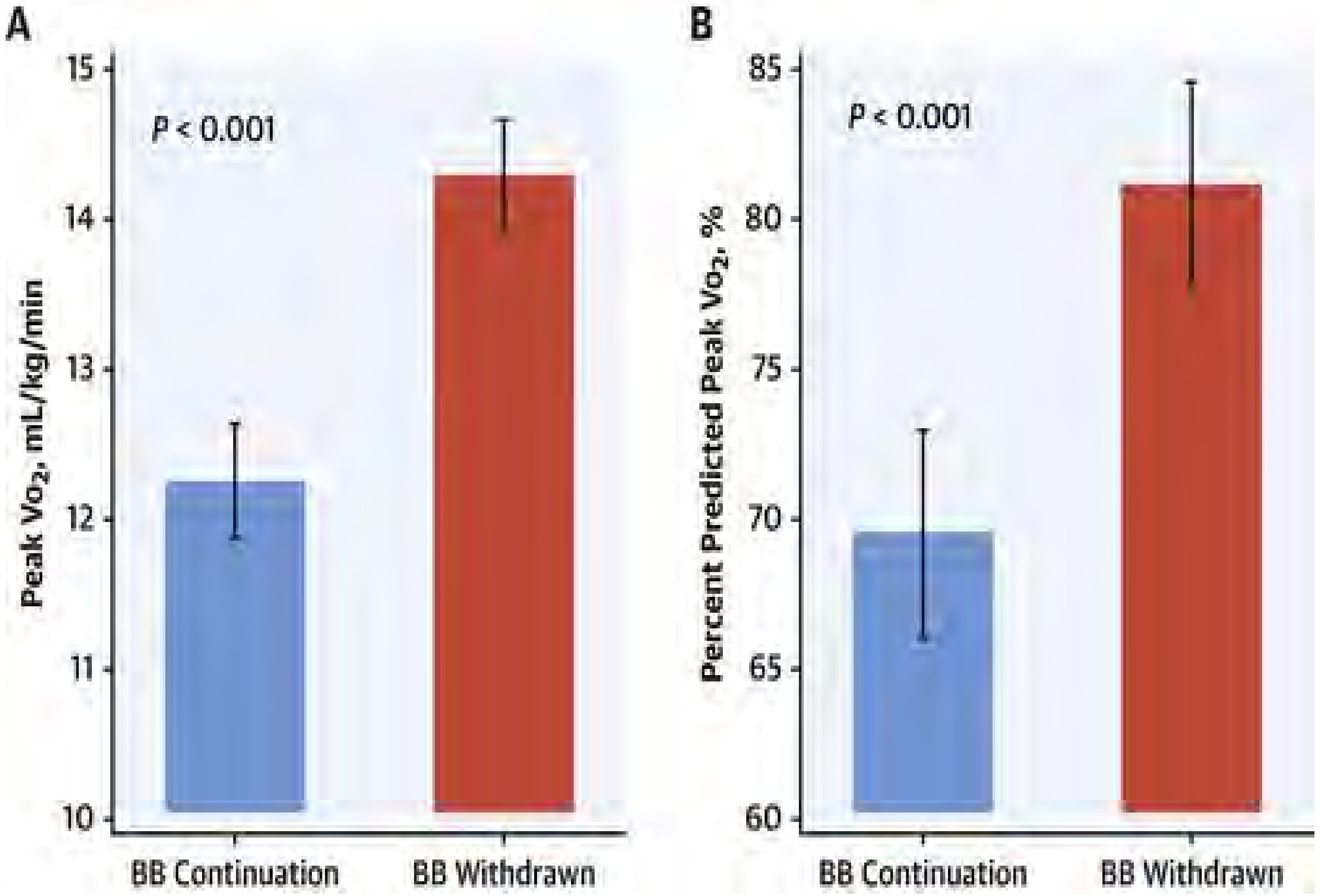
Voors AA, et al. Presented at AHA Scientific Sessions 2021.

PACC Post-Acute Cardiology Care

Effect of β-Blocker Withdrawal on Functional Capacity in Heart Failure and Preserved Ejection Fraction





DRUGS TO AVOID IN CHF

- NSAIDs and COX-2 inhibitors
- Nondihydropyridine CCBs (avoid only for systolic heart failure)
- –Diltiazem
- –Verapamil
- Pioglitazone, rosiglitazone-Frequently exacerbates edema
- Cilostazol (Pletal) – decrease survival in Class II-IV CHF
- Dronedarone (Multaq) – risk of death doubles with decompensated CHF or Class IV CHF

A Few Pearls

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Diuretics:

- No mortality benefit, may increase mortality in long term use, now need to really recondiser use in the setting of newer therapies.

ACE/ARB/ARNI

- Monitor for volume depletion and electrolyte disturbances, Hypotension can occur within hours, hyperkalemia within a few days

Beta Blockers:

- Not indicated for HFpEF patients
- Monitor for fatigue, diminished exercise tolerance, bradycardia or increased dyspnea.   Check an EKG orthostatics and consider dose adjusting

PROGRAMATIC CONSIDERATIONS – The 7 M's

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Monitoring

WEIGHTS

Labs

Meals

Healthy, low sodium options

Medications

HFrEF – thoughtful use of diuretics BB, ACE/ARB, MRA, hydralaizine/nitrates

HFpEF – thoughtful use of diuretics, SGLT2, ARNI antihypertensives

Multiple Co-Morbidities

Optimize pulmonary and renal disease management

Movement

Daily activity, not just for CV benefits, but provides clinical insight

Mentoring

Engage the patient/caregiver in the proves, if community discharge, make weights interactive, tell them what their medications are for

Motivations

What does patient want, what are goals of care

Non-Congested Symptomatic HFpEF Patients - Practical Tips

- SNF setting may be ideal for initiation of MRA
  - Ease of monitoring/laboratory evaluation

- Chronotropic Incompetence
  - Indication/Dosing of Beta Blockers

- Peripheral Vasculature Dysfunction
  - Exercise

- Set-up for Success!
  - Dietary and exercise education
  - Collaboration with HF Clinic/Community Cardiologist

Review Article

Tufts Medical Center

Skilled Nursing Facility Care for Patients With Heart Failure: Can We Make It "Heart Failure Ready?"

Nicole M.Orr MD, Rebecca Boxer MD, MS, Mary Dolansky RN, PhD, Larry Allen MD, MHS, Daniel E. Forman MD

Impact of Specialty Oversite During Transitions to Post-Acute Care

Tufts Medical Center

- 2 years in Model 2 Bundle BPCI
- Cardiologist led HF program vs other programs
- Transitional care components included obtaining cardiac relevant hospital documentation
- Communication between cardiologist and community and SNF providers
- *Consistent focus on clinical rounds to geriatric conditions, co-morbidities and functional status
- Verbal handoff upon community D/C for high risk patients

SNFs in Genesis BPCI Model 3 (N=32)	# SNFs	Total # Patients	# Patients readmitted w/in 90 Days	90-Day Episodic Readmission Rate	Total # 90-Day Readmissions/ HF Episode	# Patients readmitted w/in 30 Days	30-Day Episodic Readmission Rate
St. Joseph's Center	1	22	6	27.3%	47.1%	1	4.5%
All BPCI-enrolled SNFs	31	813	364	44.8%	65.6%	192	23.6%
Other SNFs with HF Programs	7	291	142	48.8%	74.8%	69	23.7%

Nicole M. Orr, Leah Nazarian, In-House Cardiology Consultation Reduces Readmission Rates and Costs for Patients in Skilled Nursing Facilities: 2 Years' Experience in the Heart Failure Bundle Payment Care Improvement Initiative, Abstract #408

In-House Cardiology Consultation Reduces Readmission Rates and Costs: Experience in Heart Failure Bundle Payments for Care Improvement Initiative

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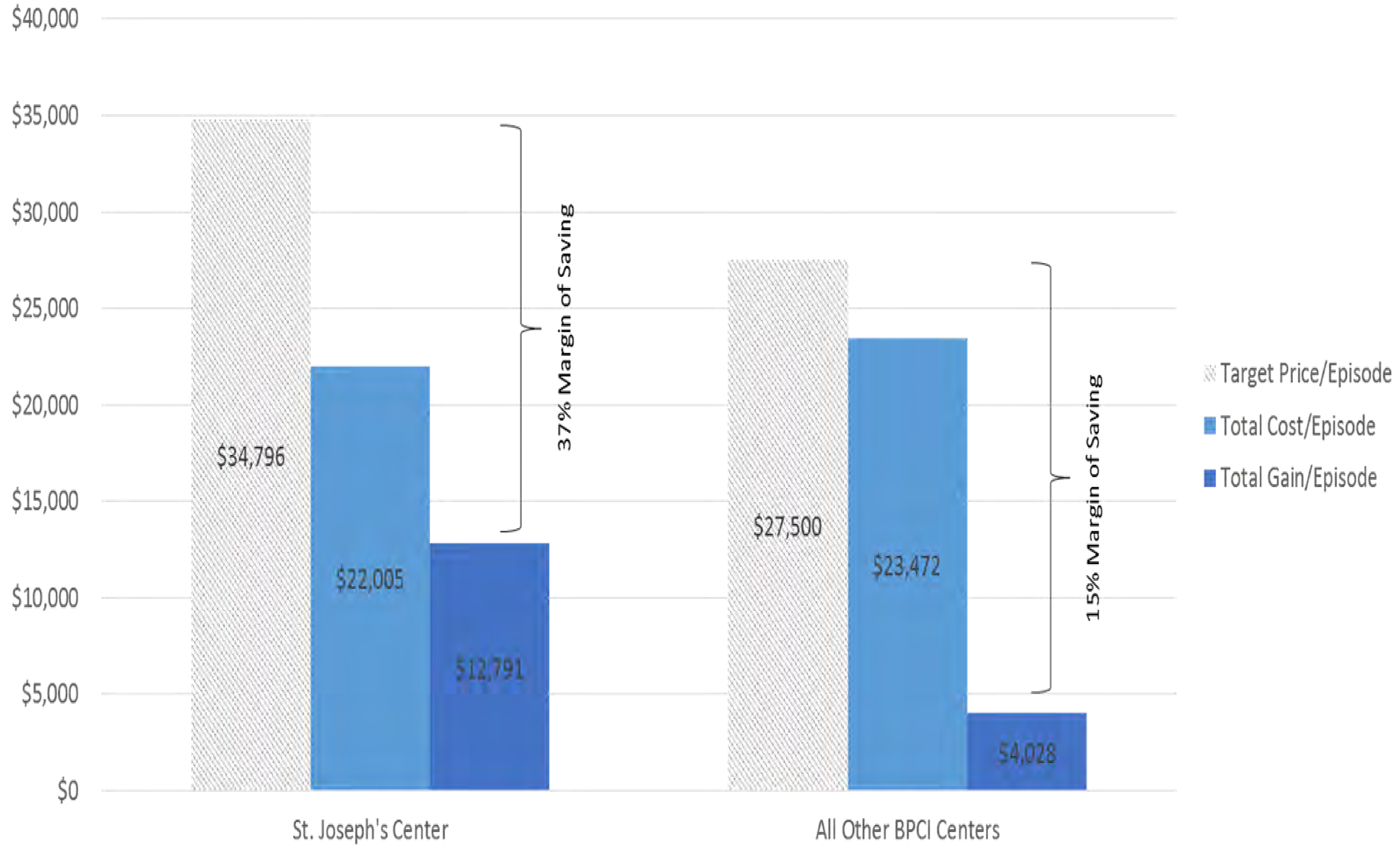
Increasing DRG Complexity

MS-DRGs of HF Episodes	HF Episodes at St Joseph's Center		All HF Episodes in Other 31 BPCI Centers		All HF Episodes in Other 7 BPCI Centers with HF Programs	
293: Heart Failure & Shock without Complication or Comorbidity or Major Complication or Comorbidity	0	0%	50	6%	19	6%
292: Heart Failure & Shock with Complication or Comorbidity	5	23%	234	29%	98	34%
291: Heart Failure & Shock with Major Complication or Comorbidity	17	**77%**	533	**65%**	175	**60%**

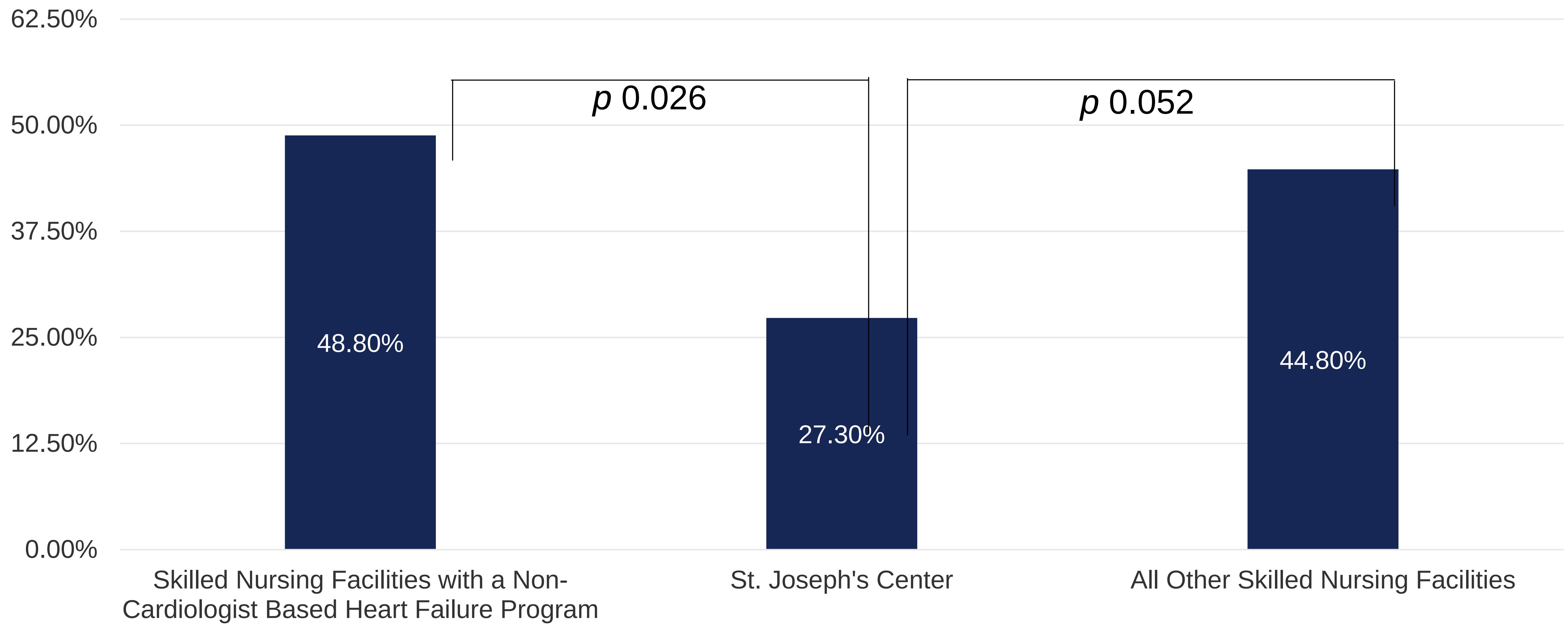
Decreasing Percentage of Complex Patients



Nicole M. Orr, Leah Nazarian, In-House Cardiology Consultation Reduces Readmission Rates and Costs for Patients in Skilled Nursing Facilities: 2 Years' Experience in the Heart Failure Bundle Payment Care Improvement Initiative, Abstract #408

PACC Post-Acute Cardiology Care

Impact of Specialty Oversite During PAC Stay



Percent of Patients with a 90-Day Readmission

Nicole M. Orr, Leah Nazarian, In-House Cardiology Consultation Reduces Readmission Rates and Costs for Patients in Skilled Nursing Facilities: 2 Years' Experience in the Heart Failure Bundle Payment Care Improvement Initiative, Abstract #408

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CASE

- 71 yo female with HFpEF, COPD, AFIB, SSS s/p PPM, obesity hypoventilation syndrome, s/p 6 day inpatient stay for dyspnea.
- Hospital course: Slight suggestion of CHF by lab and radiographic data. Developed AKI after 2 doses IV furosemide 40 mg. Diuretics held, discharged on 40 mg oral furosemide daily to SNF level care for restorative rehab
- Medications: Furosemide 40 mg daily, Carvedilol 6.25 mg BID, aspirin 81 mg, Coumadin 2.5 mg, pravastatin 20 mg
- Had been started on CHF protocol
- CC – CHF/SOB