HHP Care Model and Disease Management Webinar Series

COVID-19 Updates and Heart Failure Webinar #3: Heart Failure with Preserved Ejection Fraction (HFpEF)

Thursday, July 29, 2021
5:30pm – 6:30pm

HAWAIʻI PACIFIC HEALTH
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WILCOX

Moderator

Andy Lee, MD
Medical Director, *Hawai‘i Health Partners*
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- Specific areas may not pertain directly to your clinical practice area and/or may not be applicable to your practice based on your existing workflows, infrastructure, software (e.g. EHR), and communications processes.

Webinar Information

- You have been automatically muted.
  You cannot unmute yourself.
- You will be able to submit questions via the Q&A section.
  - Due to time constraints, any unanswered questions will be addressed this week and posted on the HHP website
- A recording of the meeting will be available tomorrow on the HHP website and intranet.

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1. Step 1: Confirm your attendance
   - You should have completed a brief questionnaire before joining today's live webinar.

2. Step 2: HPH CME team will email you instructions
   - Complete and submit evaluation survey that will be emailed to you within one week of the offering.
   - Your CE certificate will be immediately available to you upon completion of your evaluation.
   - Questions? Email hphcontinuingeduc@hawaiipacifichealth.org

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Disclosures

- The planners and presenters of this activity report no relationships with companies whose products or services (may) pertain to the subject matter of this meeting

COVID-19 Updates

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Hawai‘i Pacific Health

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Hawaii COVID-19 Cases and Testing

LAST UPDATED ON Wednesday, July 28, 2021
DATA AS OF Monday, July 26, 2021

Cases per 100K*

An interruption in electronic lab reporting resulted in incomplete case counts reported on Monday, July 26, 2021. Retrieval of these reports is anticipated to occur the next 1-2 days.

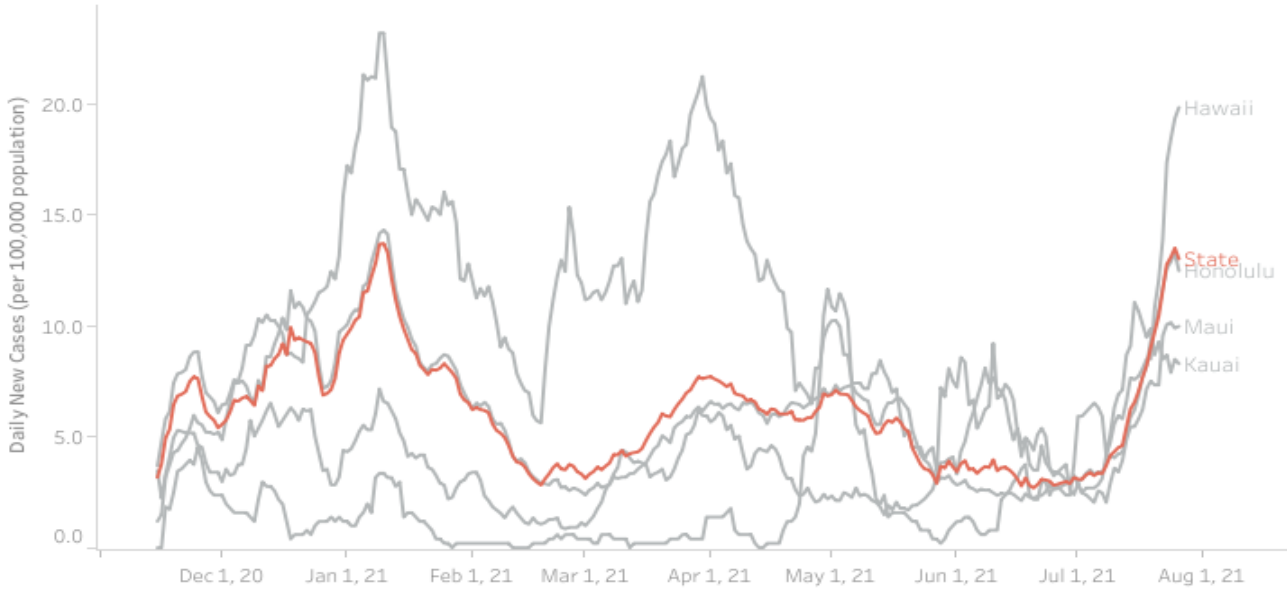
SELECT COUNTY

Select a county or more to compare

- [x] Hawaii
- [x] Honolulu
- [x] Kauai
- [x] Maui
- [x] State

Current 7-day Average Daily New Cases (per 100,000 population)

State	Hawaii	Honolulu	Kauai	Maui
13.0	19.8	12.5	8.3	10.0



*7-day moving daily average cases per 100,000 population; Includes both confirmed and probable cases; Chart excludes 483 probable cases with missing date information

VIEW BY ISLANDS

SELECT DATE RANGE

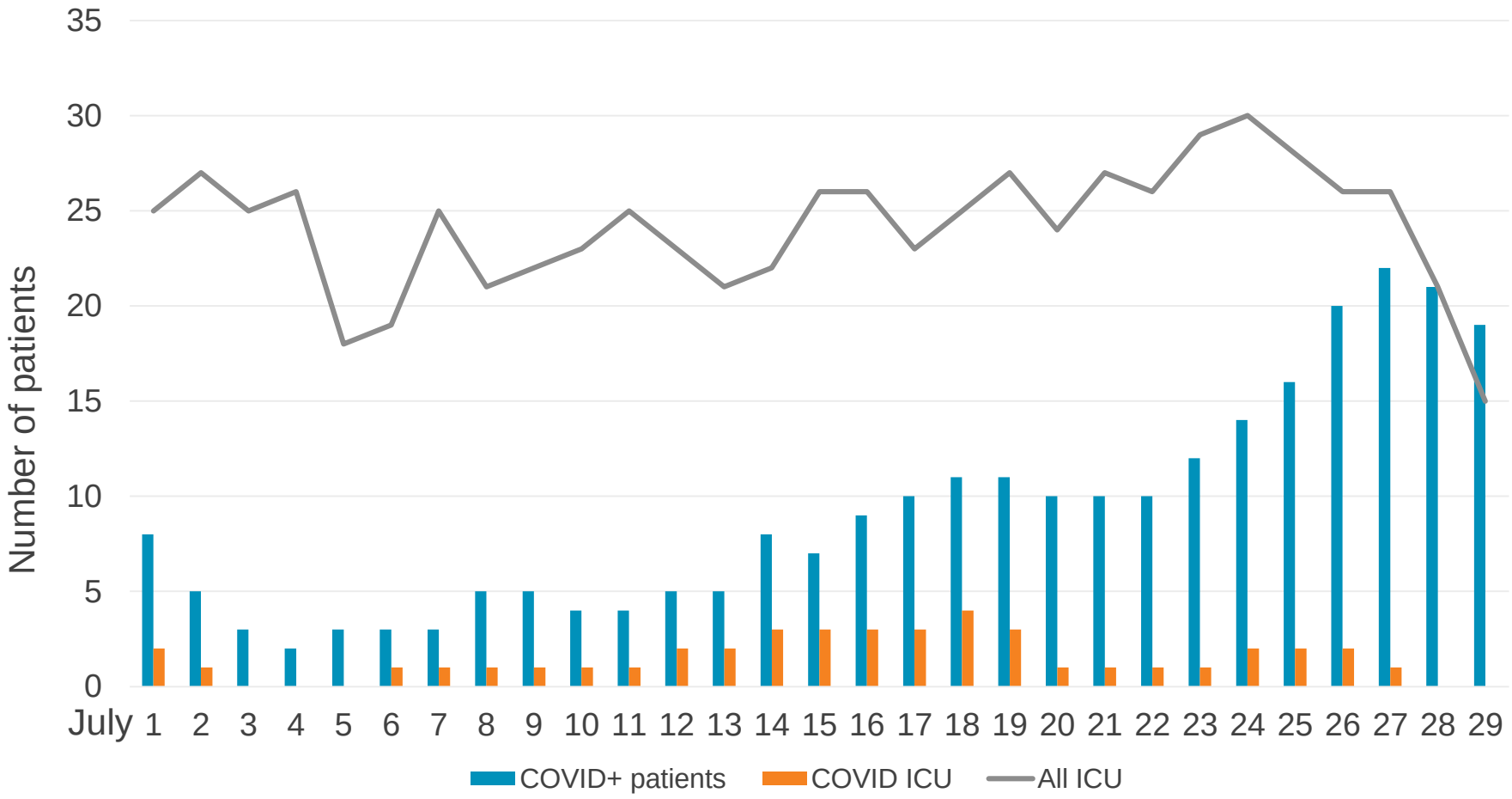
From 10/14/2020

NAVIGATE TO OTHER VIEWS

Click buttons to navigate to other views

SUMMARY | MAP | EPI CURVE | COUNTY RATES | TESTING

Inpatient COVID-19 Activity: All HPH, July 2021



Confirmed COVID-19 cases: 07/29/2021

Age	KMCWC	PMMC	SMC	WMC	HPH
< 12					
12-20					
21-35	2		3		5
36-50		2	2		4
51-65		1	4	2	7
66-75	1	2		0	3
> 75		2			2
Total	3	7	9	2	21

Hot Topic: Delta Variant

- Now the most dominant variant in the US
- Much more easily transmissible
  - More virus replication
  - Spreads to more people
- Unclear if more severe disease
  - Asymptomatic spread continues to be a problem
  - If symptoms occur, they may present sooner

Delta Variant and Vaccines

- Current vaccines in US protect against severe disease and death

- Study results are inconsistent:
  - A full course of the Pfizer-BioNTech vaccine
    - 39% effective at preventing infections reported by Israel's health ministry
    - 64% two weeks prior
  - Other recent studies
    - 80% - 90% protection against infection and mild illness including peer reviewed research from Public Health England

Delta Variant and Vaccines

- Breakthrough infections may occur in fully vaccinated people
  - Usually spread from infected unvaccinated people
  - Unusual to have spread from vaccinated to vaccinated
  - Severe disease has occurred in fully vaccinated patients with comorbid conditions or who are elderly

Updated CDC Guidance: 07/28/21

Interim Public Health Recommendations for Fully Vaccinated People

Summary of Recent Changes:

- Recommendation for fully vaccinated people to wear a mask in public indoor settings in areas of substantial or high transmission
- Fully vaccinated people might choose to wear a mask regardless of the level of transmission if:
  - immunocompromised
  - at increased risk for severe disease
  - someone in their household is immunocompromised, at increased risk of severe disease or not fully vaccinated

Updated CDC Guidance: 07/27/21

Summary of Recent Changes, cont'd:

- Added a recommendation for fully vaccinated people who have a known exposure to someone with suspected or confirmed COVID-19 to be tested 3-5 days after exposure, and to wear a mask in public indoor settings for 14 days or until they receive a negative test result.

- CDC recommends universal indoor masking for all teachers, staff, students, and visitors to schools, regardless of vaccination status.

Lots of questions about boosters…..

- Boosters will be needed if:
  - Duration of immunity is shown to wane over time
  - Vaccine induced immunity doesn't confer protection for circulating variants

- Currently, no recommendation for routine boosters
  - CDC/FDA may soon recommend boosters for immunocompromised and elderly

HPH Response to Increased Disease Activity

- Reinstituted use of N95s for all ED care and all aerosol generating procedures
  - regardless of vax status
- Reinstituted pre-procedural testing for all
  - regardless of vax status
- Reinstituted masks/facial coverings for all employees
  - regardless of vax status

HPH Response to Increased Disease Activity

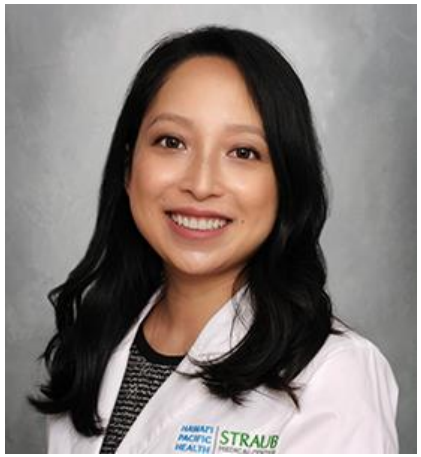
- Strengthening our visitor management
  - 1 adult visitor per inpatient or accompanying an outpatient at Straub, Pali Momi and Wilcox (may swap out)
  - 2 adult visitors at all locations at Kapiʻolani and at Wilcox Labor and Delivery (may swap out)

- Looking at revisions to our return to work policy
  - Will modify to comply with CDC guidance updates

HPH Vaccination Sites: update

- We are closing Pier 2 on July 31, 2021
  - ~185,000 doses provided there
- We are relocating the vaccination clinic to Kapiʻolani
  - Anticipating the next big group of vaccine recipients will be under 12 years old
  - Urgent Care and Clinic locations
- VaxSquad bus will continue
  - Return visits to schools are popular

Heart Failure with Preserved Ejection Fraction HFpEF



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Objectives

- Epidemiology
- Pathophysiology
- Definition
- Diagnosis
- Management

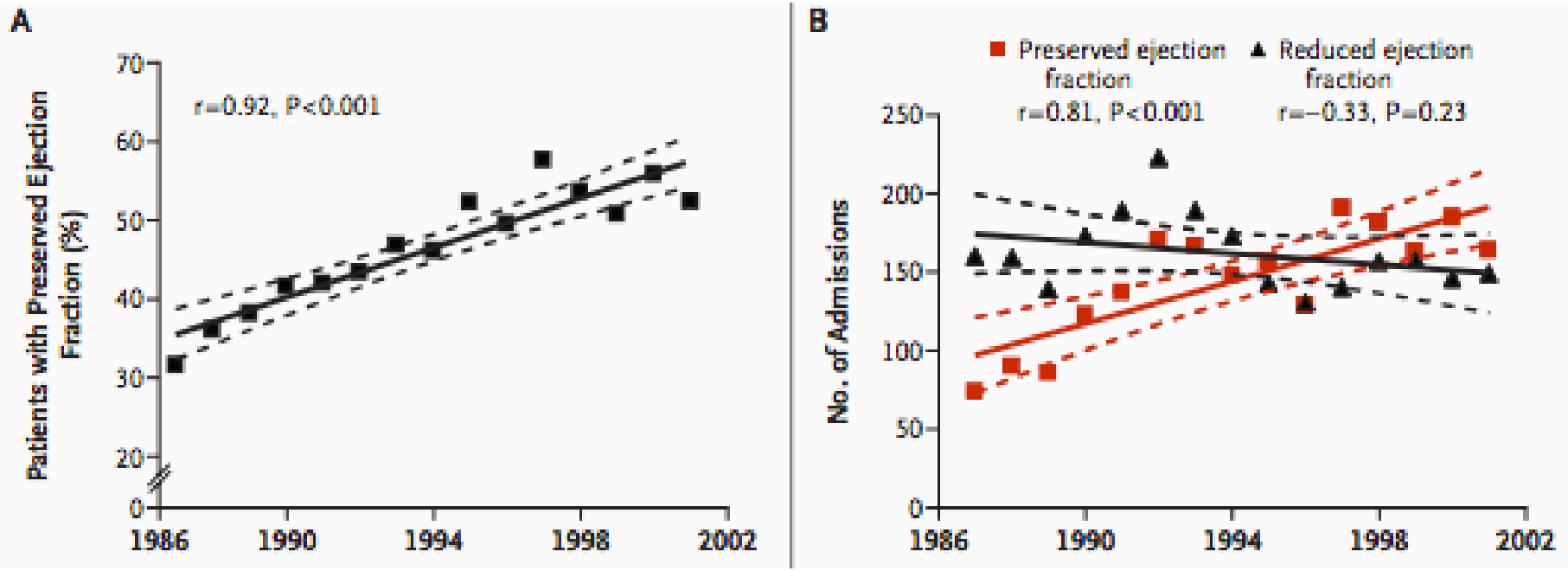
Epidemiology

- 6.5 million U.S. adults have heart failure
- HFpEF accounts for approximately 50% of heart failure cases
- Overall prevalence of HFpEF has been reported to be 1.1-5.5% in the general population
    - Estimation of prevalence has been challenging due to lack of standardization in the diagnostic criteria and difficulties in the diagnosis of HFpEF

Curr Heart Fail Rep. 2013;10(4):401-10.

Epidemiology

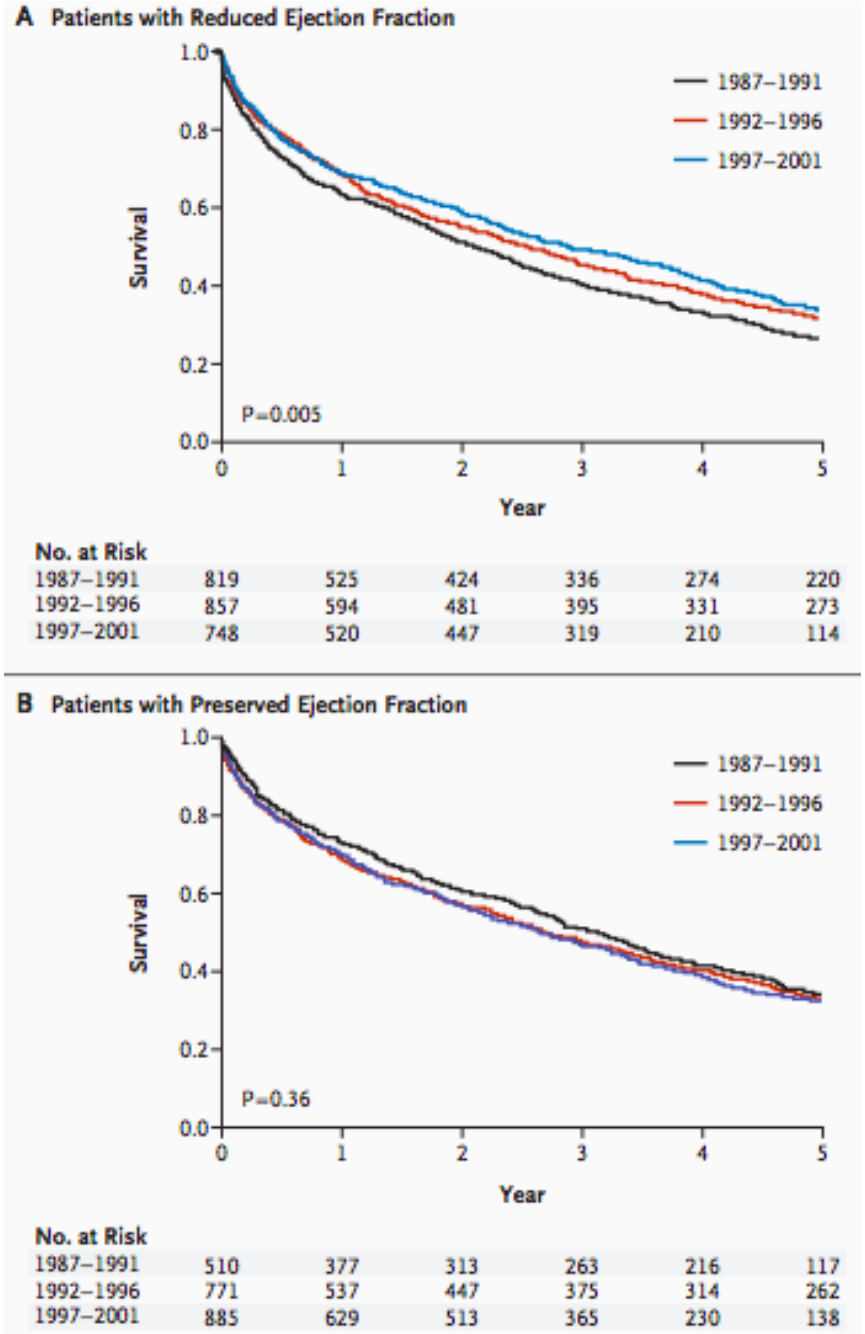
- Prevalence of HFpEF relative to HFrEF is increasing at a rate of 1% per year
- HFpEF is on track to become the most common type of HF in the near future



Curr Heart Fail Rep. 2013;10(4):401-10.
N Engl J Med. 2006;355(3):251-9.

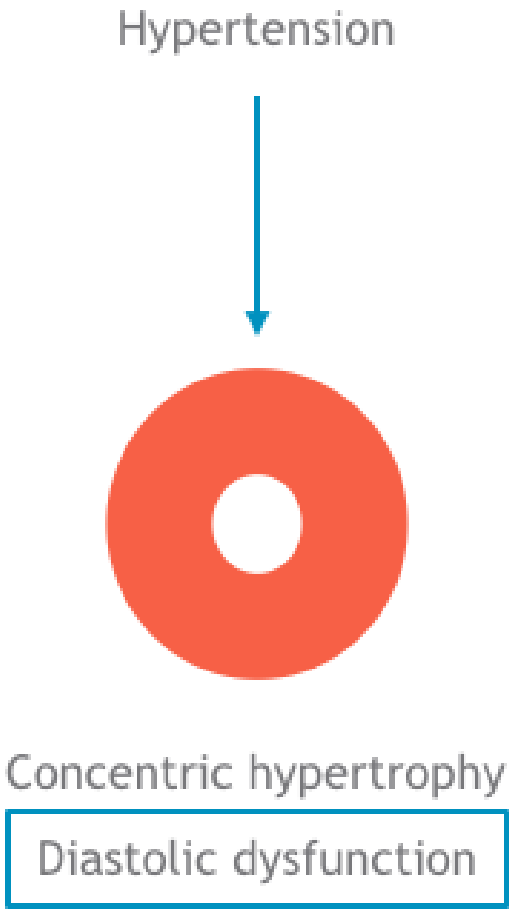
Prognosis

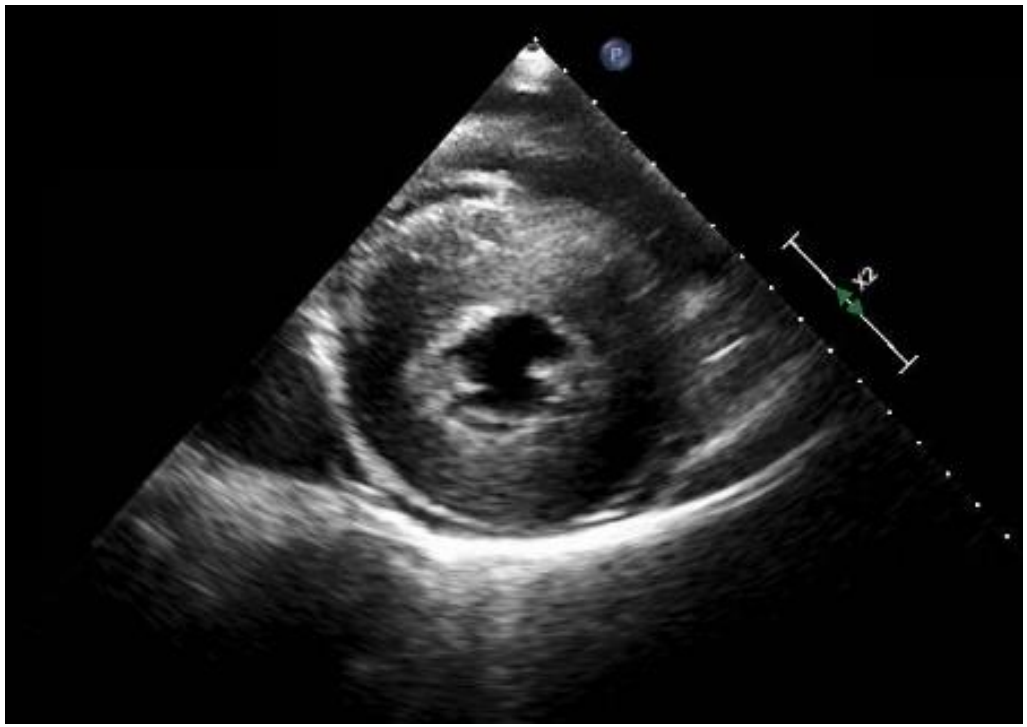
- High risk of cardiovascular death and repeat hospitalizations
- Survival in HFpEF has not shown any significant change
- 5-year survival 35-40% after hospitalization for HF
- Lack of evidence-based treatment



Curr Heart Fail Rep. 2013;10(4):401-10.
N Engl J Med. 2006;355(3):251-9.

Traditional Concept of HFpEF: Diastolic Dysfunction





Nat Rev Cardiol. 2012;9(10):555-6.

Diastolic Dysfunction

- Diastolic dysfunction is a pathophysiologic condition

- Impaired myocardial relaxation and/or decreased LV compliance → elevated filling pressures

Diastolic Dysfunction ≠ HFpEF

- Not all patients with diastolic dysfunction have or will develop clinical HFpEF
  - Can be seen with normal aging and cardio metabolic abnormalities
  - >90% of patients >65 years have abnormal diastolic dysfunction

- Some HFpEF patients may have minimal diastolic dysfunction

- Significant limitations with evaluation of diastolic dysfunction
  - Large inter-observer variation
  - Evaluation relies on multiple different criteria that are not easy to apply

J Am Coll Cardiol Img. 2020;13(1): 245-57.

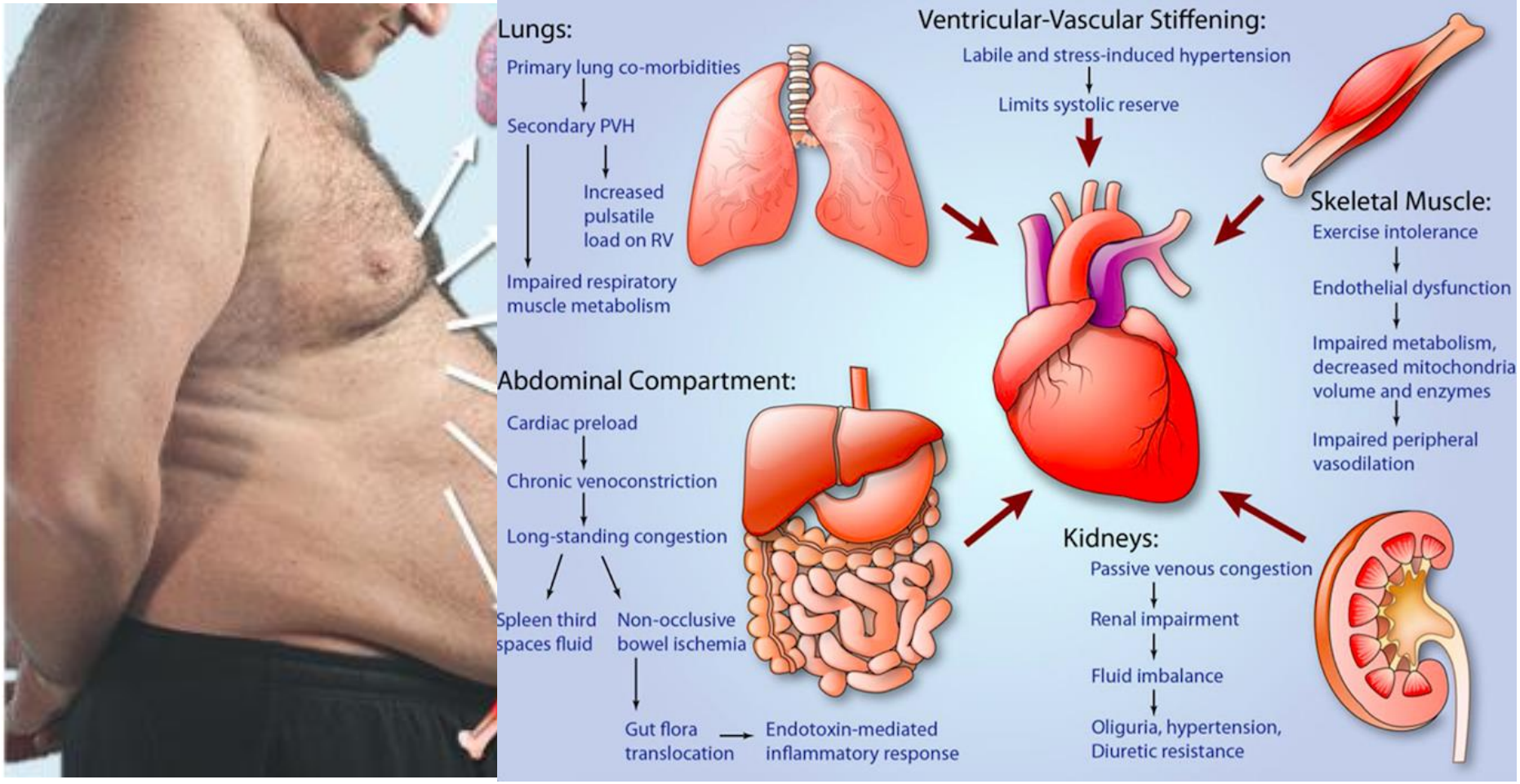
Diastolic HF vs HFpEF

- “Diastolic HF” is suboptimal
  - Suggests a single mechanism underlying the pathophysiology of HFpEF

- Several alternative and complementary physiologic mechanisms exist:
  - Longitudinal LV systolic dysfunction (despite normal EF)
  - Left atrial dysfunction
  - Pulmonary hypertension
  - Abnormal ventricular-arterial coupling
  - Abnormal exercise-induced vasodilation
  - Extracardiac volume overload
  - Chronotropic incompetence

Circ Res. 2014;115(1):79-96
Curr Cardiol Rev. 2015;11(1):42-52

A Heterogenous Syndrome



J Am Coll Cardiol. 2016;68(2):200-3.
Circ Res. 2014;115(1):79-96.

HFpEF Hypothesis

Comorbidities

↓

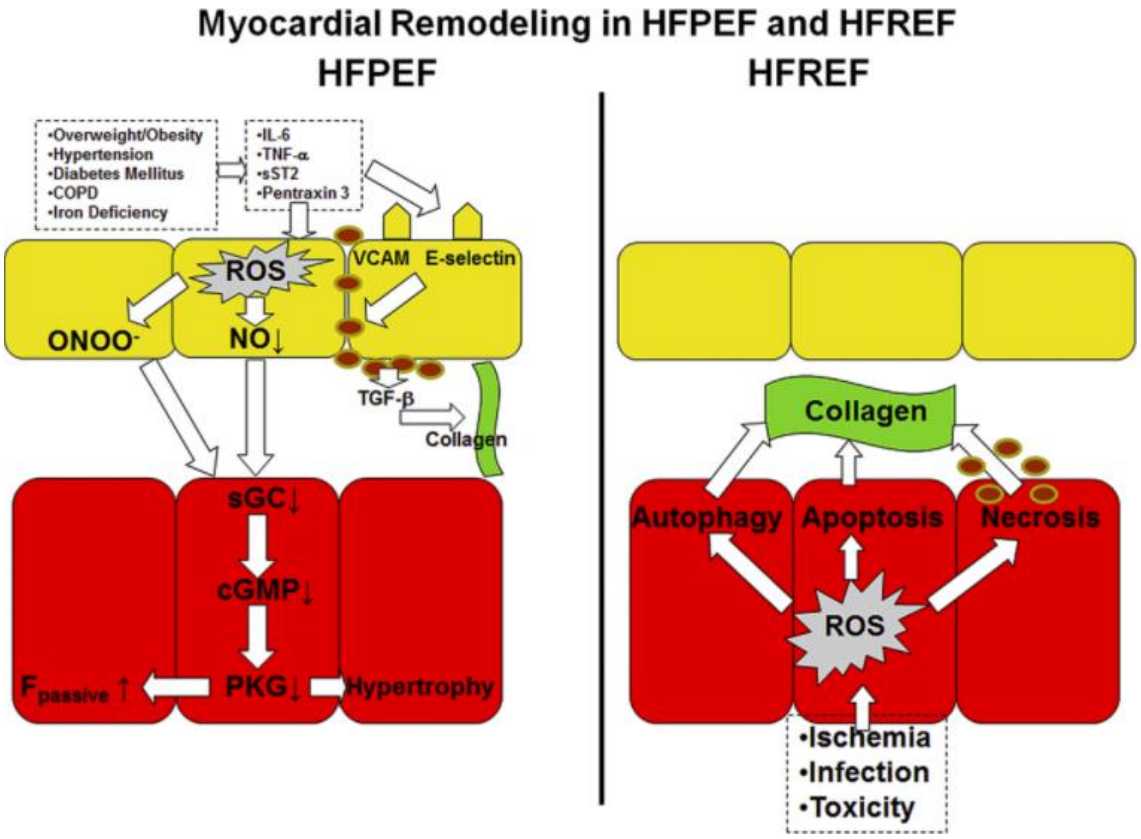
Peripheral insult

↓

Secondary myocardial injury

↓

HFpEF



Primary injury

↓

HFrEF

J Am Coll Cardiol. 2013;62(4):263-71

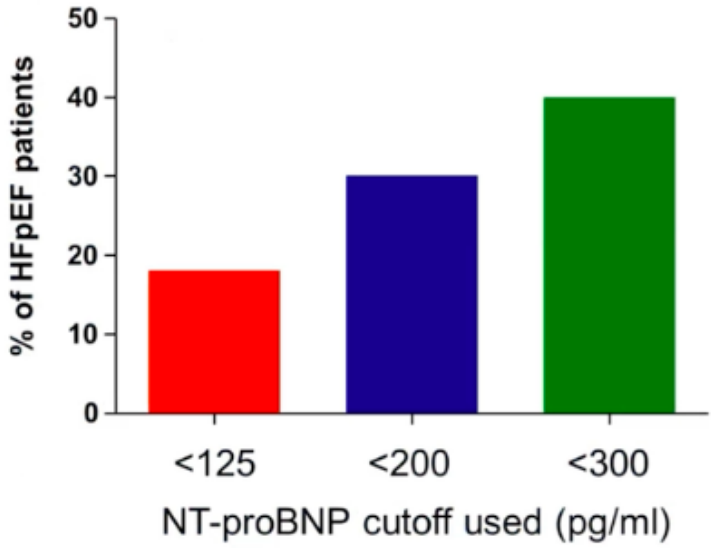
HFpEF Definition

- Symptoms and/or signs of heart failure
  - Dyspnea, edema, exercise intolerance, elevated JVP, rales, pulmonary edema on CXR, etc.
- Preserved LV function (>45-50%)
- Objective evidence of elevated LV filling pressures at rest *or during exercise*
  - Elevated natriuretic peptide*
  - Increased left atrial size
  - Elevated LV filling pressure (increased E/e', PCWP, or LVEDP *at rest or with exercise*)

Curr Cardiol Rep. 2016;18(12):122.

Biomarkers

- A normal BNP does not exclude HFpEF



- Mechanism of “normal BNP”:
  - Obesity is associated with increased BNP clearance and decreased production
  - Wall stress is lower in HFpEF compared to HFrEF

Circ. 2017;135(9):825-838.
Curr Cardiol Rep. 2016;18(12):122.

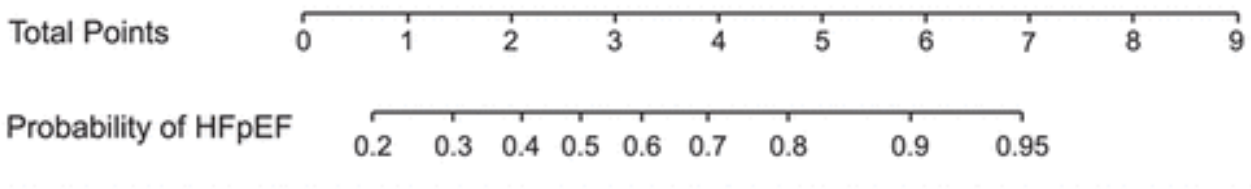
HFpEF Diagnosis

Case

- 70 yoF with hypertension and metabolic syndrome who presents with dyspnea on exertion
- Appears “euvolemic” on exam. BMI 38.
- No ED or hospitalizations for volume overloaded episodes
- Normal BNP
- Echo:
  - LVEF 55-60%
  - Mild left atrial enlargement
  - Grade I diastolic dysfunction
  - E/e’ 11
  - RVSP 36

H2FPEF Score

	Clinical Variable	Values	Points
H_2	Heavy	Body mass index > 30 kg/m^2	2
	Hypertensive	2 or more antihypertensive medicines	1
F	Atrial Fibrillation	Paroxysmal or Persistent	3
P	Pulmonary Hypertension	Doppler Echocardiographic estimated Pulmonary Artery Systolic Pressure > 35 mmHg	1
E	Elder	Age > 60 years	1
F	Filling Pressure	Doppler Echocardiographic E/e' > 9	1
H_2FPEF score			Sum (0-9)



- **Score of 0-1: Low risk**
- **Score of 6-9: High risk**
- **Score of 2-5: Intermediate risk**

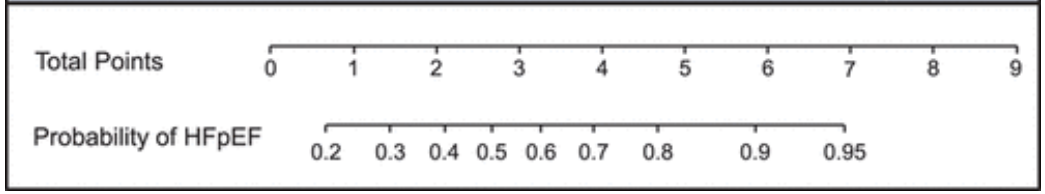
Circ. 2018;138(9):861-70.

Case

- 70 yoF with hypertension and obesity (BMI 38)

- Echo:
  - LVEF 55-60%
  - Mild left atrial enlargement
  - Grade I diastolic dysfunction
  - E/e’ 11
  - RVSP 36

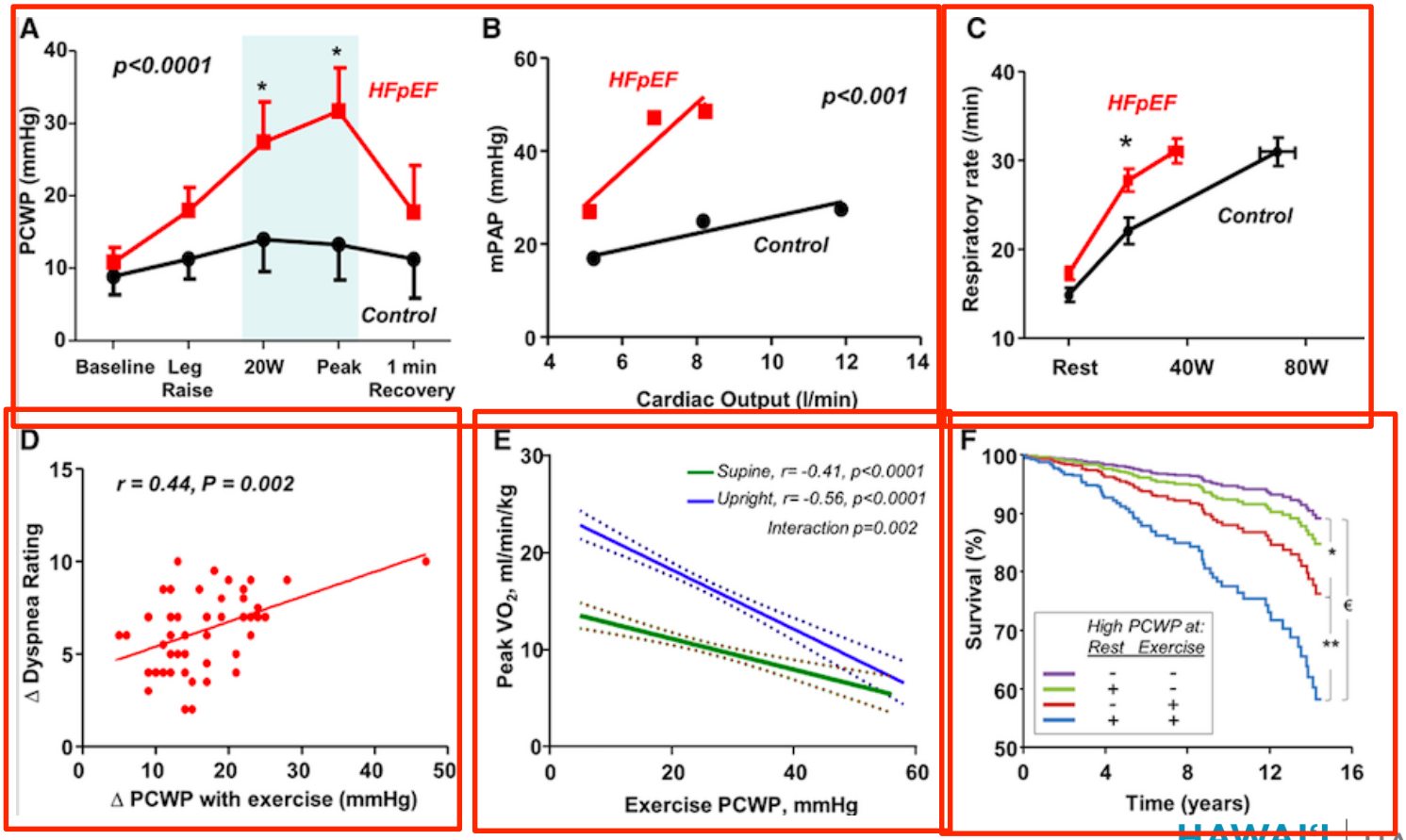
	Clinical Variable	Values	Points
H_2	Heavy	Body mass index > 30 kg/m^2	2
	Hypertensive	2 or more antihypertensive medicines	1
F	Atrial Fibrillation	Paroxysmal or Persistent	3
P	Pulmonary Hypertension	Doppler Echocardiographic estimated Pulmonary Artery Systolic Pressure > 35 mmHg	1
E	Elder	Age > 60 years	1
F	Filling Pressure	Doppler Echocardiographic E/e’ > 9	1
H_2FPEF score			Sum (0-9)



H2FPEF Score= 6

Right Heart Catheterization

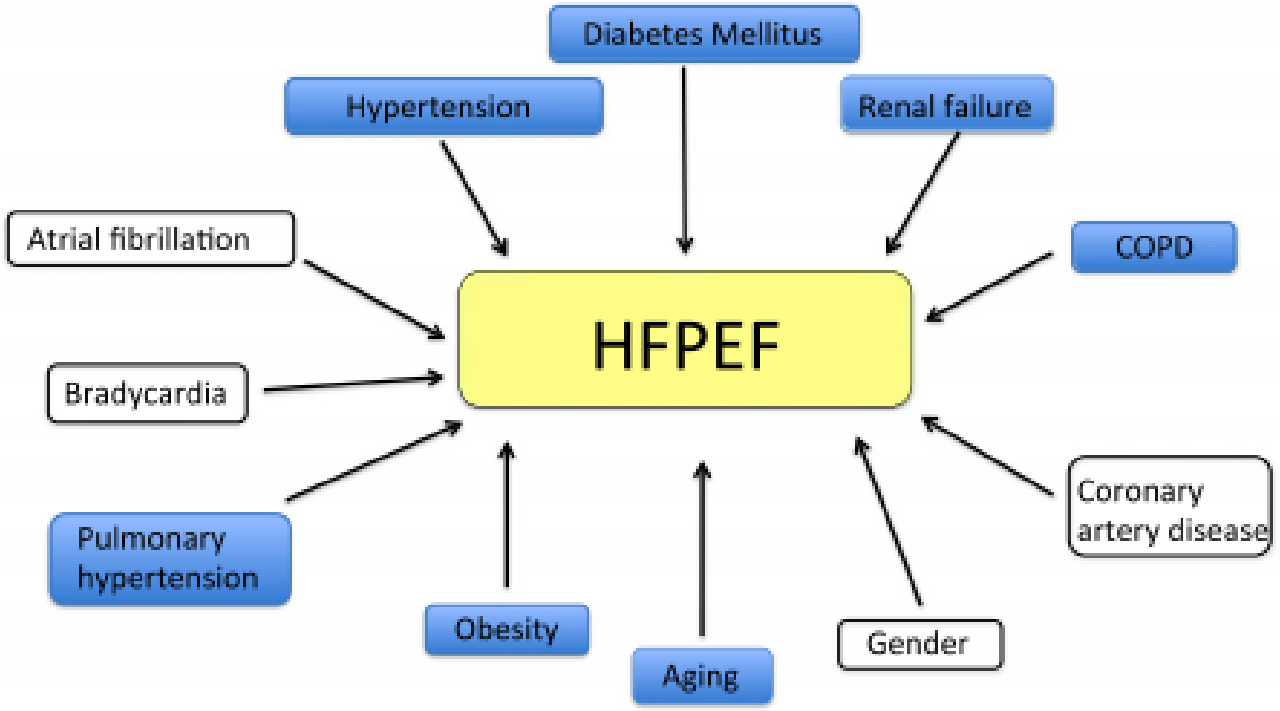
- Patients with “early” stage of disease, LV filling pressure is normal at rest but becomes elevated only during the stress of exercise



Circ Res. 2019;124(11):1598-1617

Focus on Etiology of HFpEF

- It is important to determine the etiology of the heart failure syndrome in a patient with preserved ejection fraction



Int J Cardiol. 2015;189:259-63

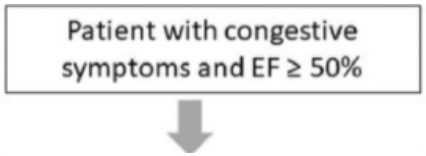
Case

Which patient has HFpEF?

- 68 yoF with stage 4 CKD, HTN, and obesity who presents with dyspnea on exertion and atrial fibrillation. Echo with LVEF >50%, LVH. BNP 300.

- 68 yoM with carpal tunnel syndrome and lumbar spinal stenosis, presents with dyspnea on exertion and atrial fibrillation. Echo with LVEF >50%, LVH. BNP 300

Focus on Etiology



J Card Fail. 2021;27(6):622-24.

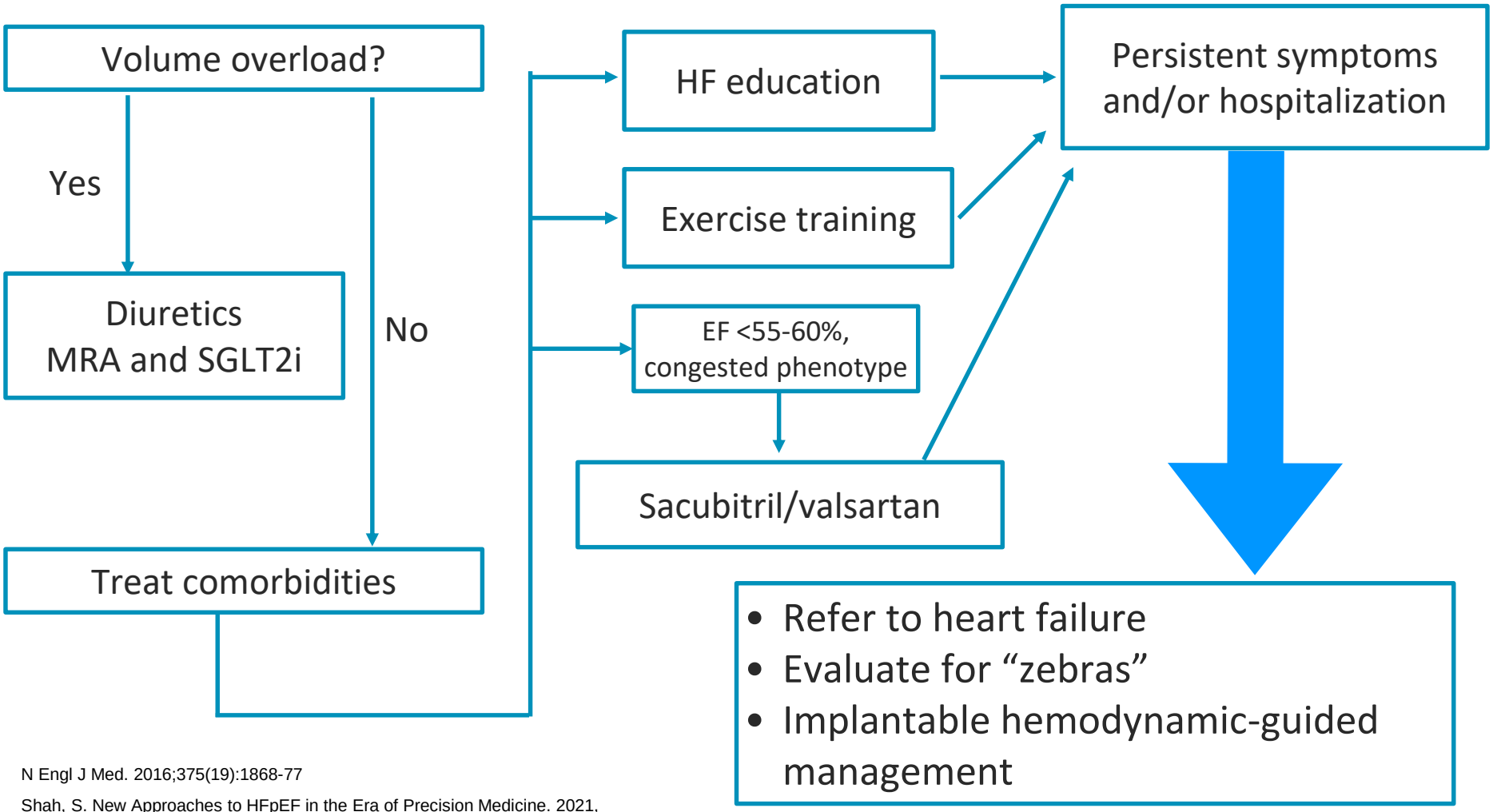
ACC/AHA Guidelines

- Manage the co-morbidities
- Co-morbidities drive as much the adverse outcomes as the HF syndrome itself

COR	LOE	Recommendation
I	B	SBP and DBP should be controlled according to guidelines
I	C	Diuretics for relief of symptoms, volume overload.
IIa	C	Coronary revascularization if evidence of significant CAD and symptoms/ischemia despite GDMT.
IIa	C	Management of atrial fibrillation according to published guidelines.
IIb	B-R	Spironolactone to reduce heart failure hospitalizations if EF >45%, GFR >30, creatinine <2.5, and K<5.0.
IIb	B	ARBs to reduce HF hospitalization.
III	B-R	PDE5i and nitrates are ineffective for QOL, physical activity.

Circ. 2013;128(16): 240-327.
Circ. 2017;136(6): 136-61.

Treatment Algorithm



N Engl J Med. 2016;375(19):1868-77

Shah, S. New Approaches to HFpEF in the Era of Precision Medicine. 2021, Houston Methodist.

Hypertension

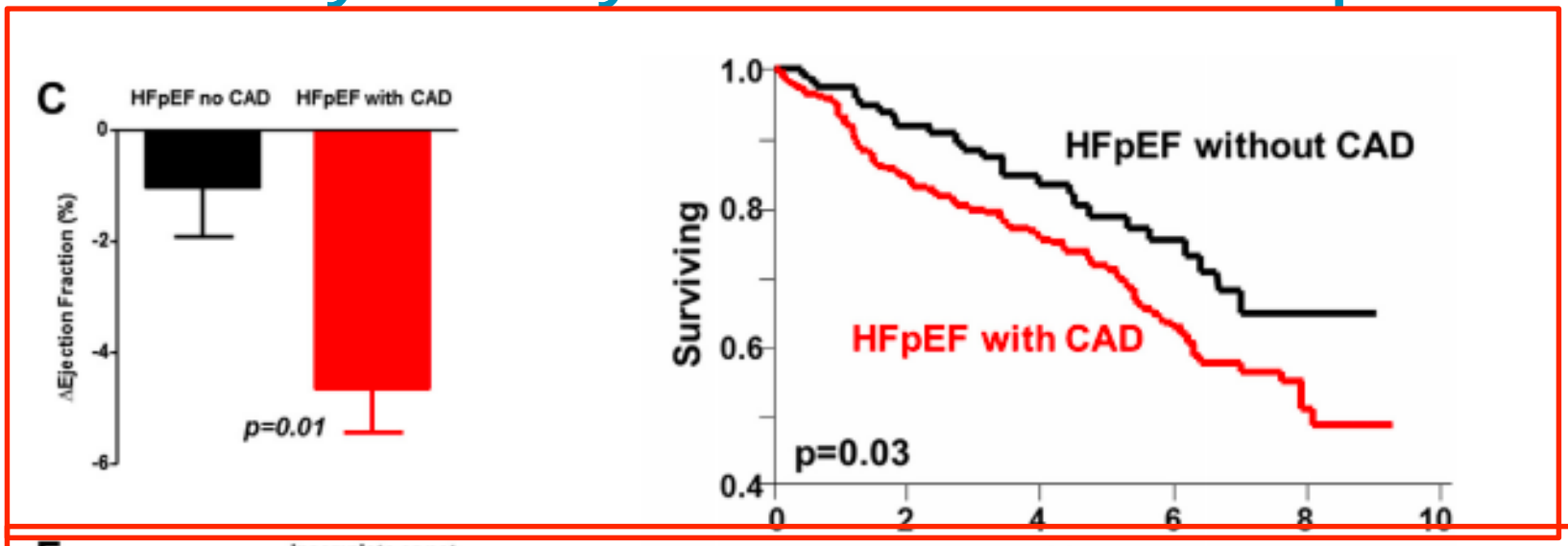
- Goal SBP < 130mmHg
- Consider ACEi/ARB, thiazide diuretic, and vaso-dilating beta-blocker (e.g., carvedilol) as first line agents
- Thiazides prevent HFpEF
- Work up secondary causes of hypertension in patients with difficult to control blood pressure

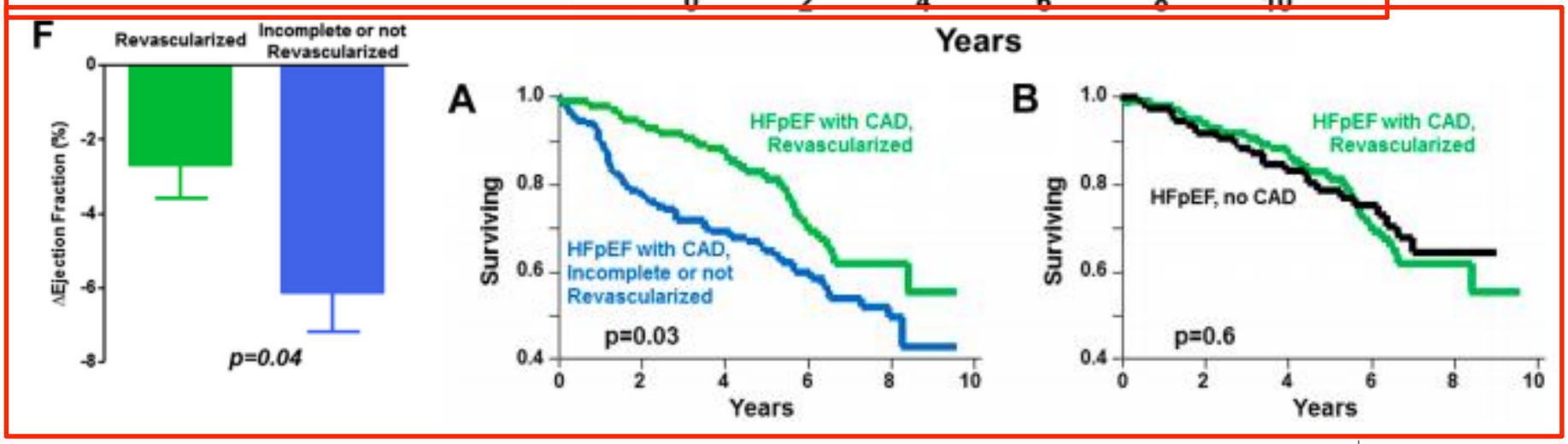
Coronary Artery Disease and HFpEF

- CAD is present in ~50% of patients with HFpEF
  - More prevalent in men with typical atherosclerotic risk factors
- All patients should be screened for CAD (non-invasive vs coronary angiography)
- If pre-test positivity is high, a negative stress test may not reliably exclude the diagnosis
  - 30% false negative rate

Curr Cardiol Rev. 2015;11(1):42-52
J Am Coll Cardiol. 2014;63(25):2817-27

Coronary Artery Disease and HFpEF

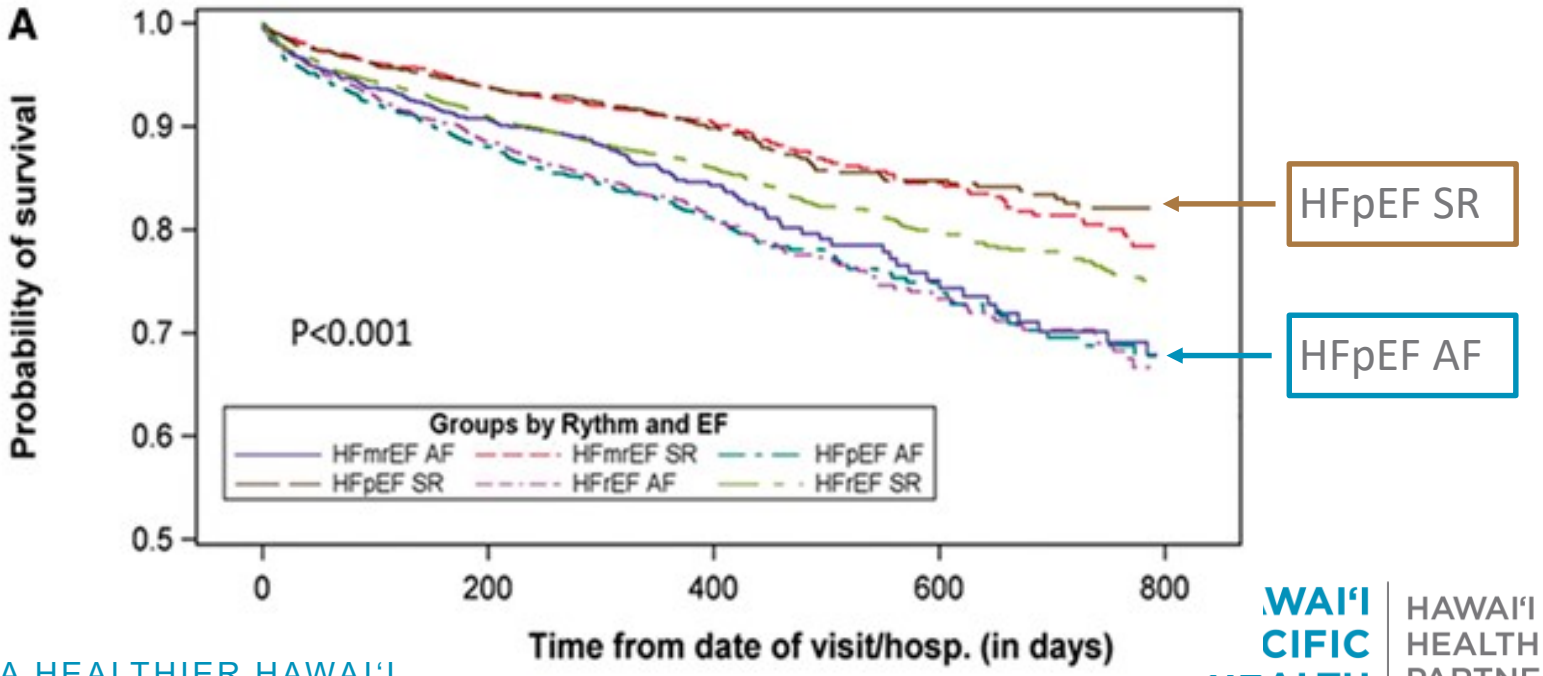




J Am Coll Cardiol. 2014;63(25):2817-27

Atrial Fibrillation

- HFpEF and atrial fibrillation often co-exist
- Associated with impaired relaxation, loss of atrial kick, shorter diastolic filling time, and elevated filling pressures
- Worsening systolic function, mitral regurgitation, and pulmonary hypertension



Eur Heart J. 2018;39(48):4277-4284

Atrial Fibrillation

- Trial of restoration to normal sinus rhythm in all patients
- Rate control with beta-blockers or non-dihydropyridine calcium channel blockers
- Caution with bradycardia, HR in the 80s is ideal
  - Patients have low stroke volume and rely on heart rate to augment their cardiac output

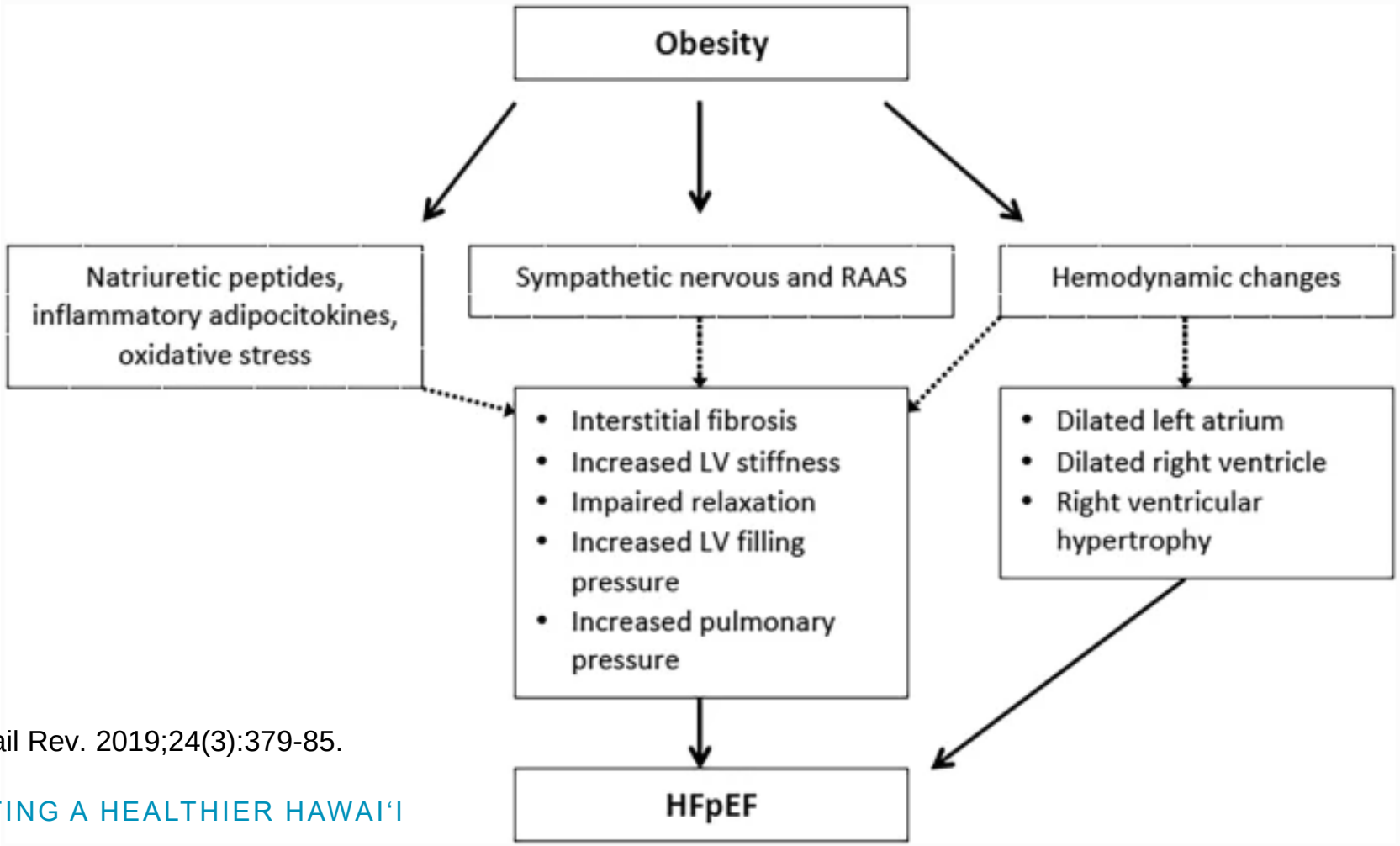
Sleep Disordered Breathing

- ~ 40% of patients have OSA and 29% have CSA
- Obstructive sleep apnea can result in left ventricular hypertrophy, diastolic dysfunction, pulmonary hypertension, and right heart failure
- HFpEF can be associated with oropharyngeal and laryngeal edema, which can cause OSA

Tex Heart Inst J. 2018;43(5):151-61.

Obesity

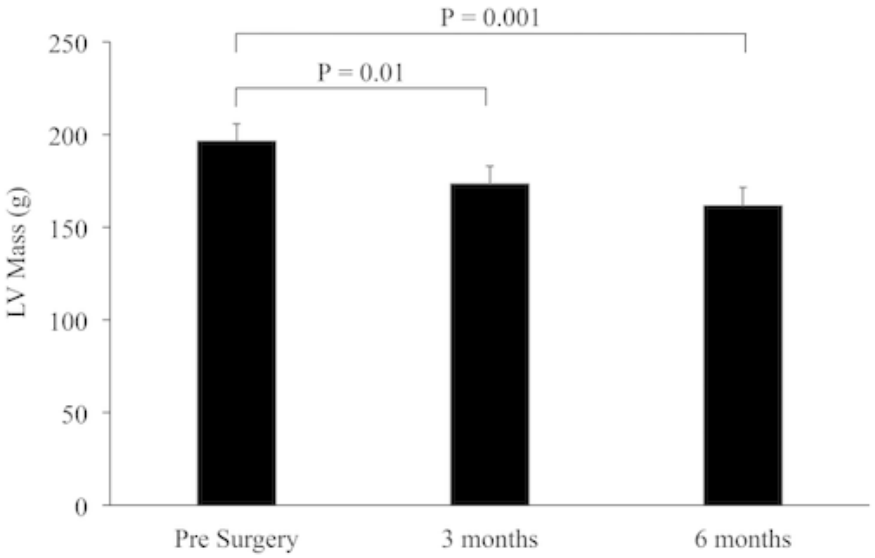
- 80% of HFpEF patients are overweight or obese

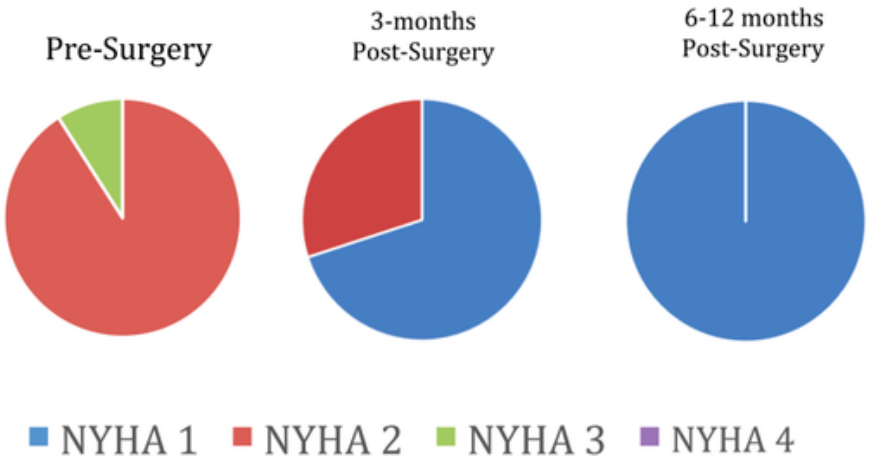


Heart Fail Rev. 2019;24(3):379-85.

Obesity

- Hemodynamic and cardiac alterations can be reversed with significant weight reduction.

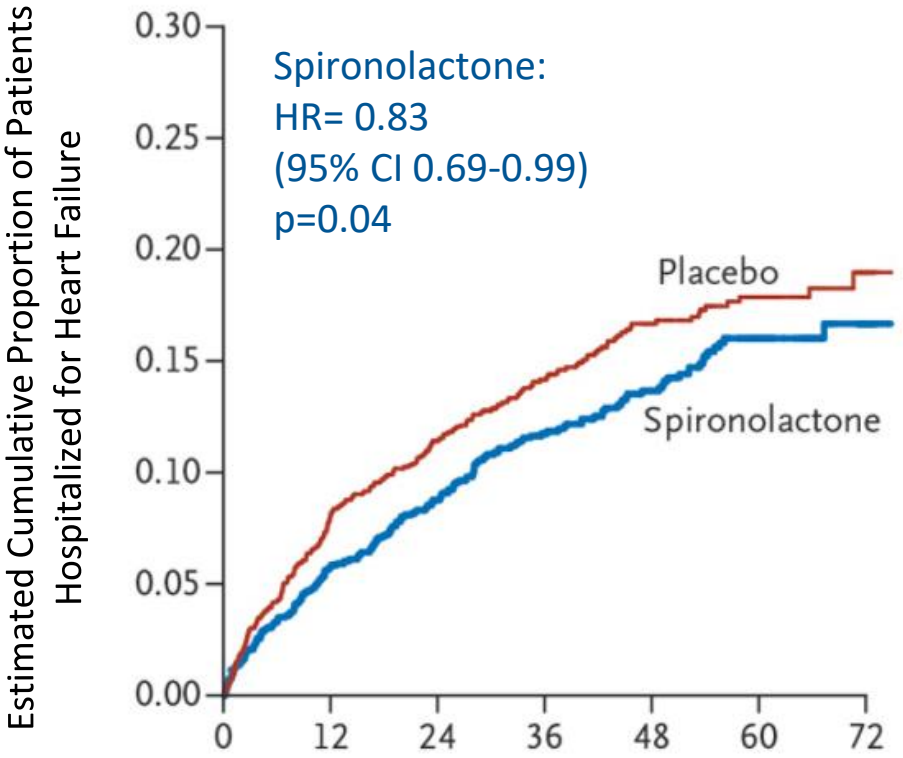


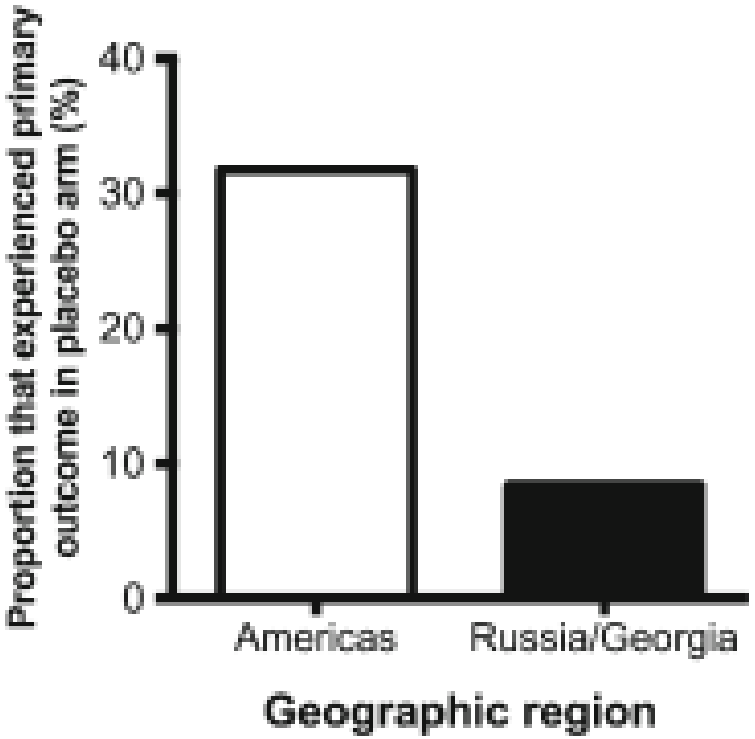


Obesity. 2018;26(2):284-90.

TOPCAT: Spironolactone

- 3445 symptomatic patients with LVEF >45%
- Primary outcome: composite of death from cardiovascular causes, aborted cardiac arrest, or hospitalization for HF

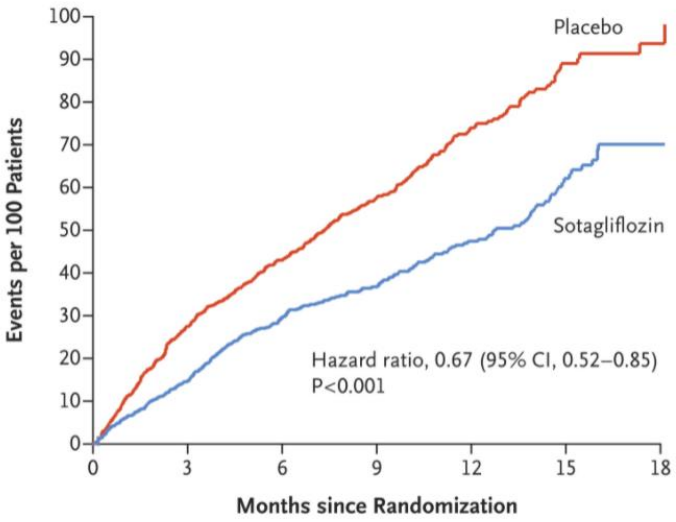




N Engl J Med. 2014; 370:1383-92
Curr Atheroscler Rep. 2015;17(64):541-6.

SOLOIST-WHF Trial: Sotagliflozin (SGLT2i/SGLT1i)

- 1222 patients with T2DM with recent hospitalization for HF (HFrEF and HFpEF)
- Primary outcome: death from cardiovascular causes, hospitalizations, and urgent visits for HF



Subgroup	No. of Patients	Sotagliflozin	Placebo	Hazard Ratio (95% CI)
		events per 100 patient-yr		
Overall	1222	51.0	76.3	0.67 (0.52–0.85)
LVEF				
<50%	966	56.9	79.9	0.72 (0.56–0.94)
≥50%	256	30.6	64.0	0.48 (0.27–0.86)
Geographic region				
North America or Latin America	346	68.3	103.0	0.64 (0.43–0.95)
Europe	800	44.1	64.7	0.69 (0.50–0.95)
Rest of the world	76	48.4	78.3	0.60 (0.23–1.58)
Timing of first dose				
Before discharge	596	52.1	76.6	0.71 (0.51–0.99)
After discharge	626	50.0	76.1	0.64 (0.45–0.90)
Sex				
Female	412	41.9	52.0	0.80 (0.51–1.25)
Male	810	55.7	89.3	0.62 (0.47–0.82)
Age				
<65 yr	364	57.1	71.1	0.79 (0.51–1.23)
≥65 yr	858	48.0	78.5	0.62 (0.47–0.82)
Estimated GFR				
<60 ml/min/1.73 m²	854	50.1	85.8	0.59 (0.44–0.79)
≥60 ml/min/1.73 m²	368	53.1	58.1	0.90 (0.58–1.37)

N Engl M Med. 2021; 384:117-28.

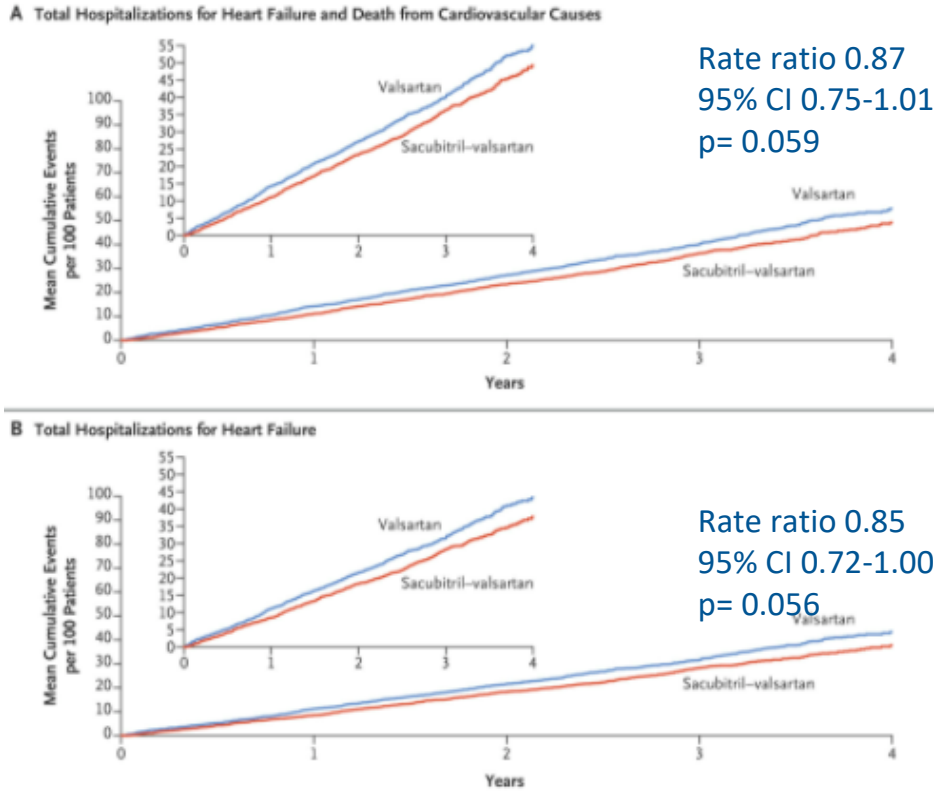
EMPEROR-Preserved: Empagliflozin

- “Phase III trial met its primary endpoint and demonstrated significant risk reduction for the composite of cardiovascular death or hospitalization for heart failure with and without diabetes”.

https://www.boehringer-ingelheim.us/press-release/breakthrough-results-jardiance-empagliflozin-confirm-emperor-preserved-first-and-only

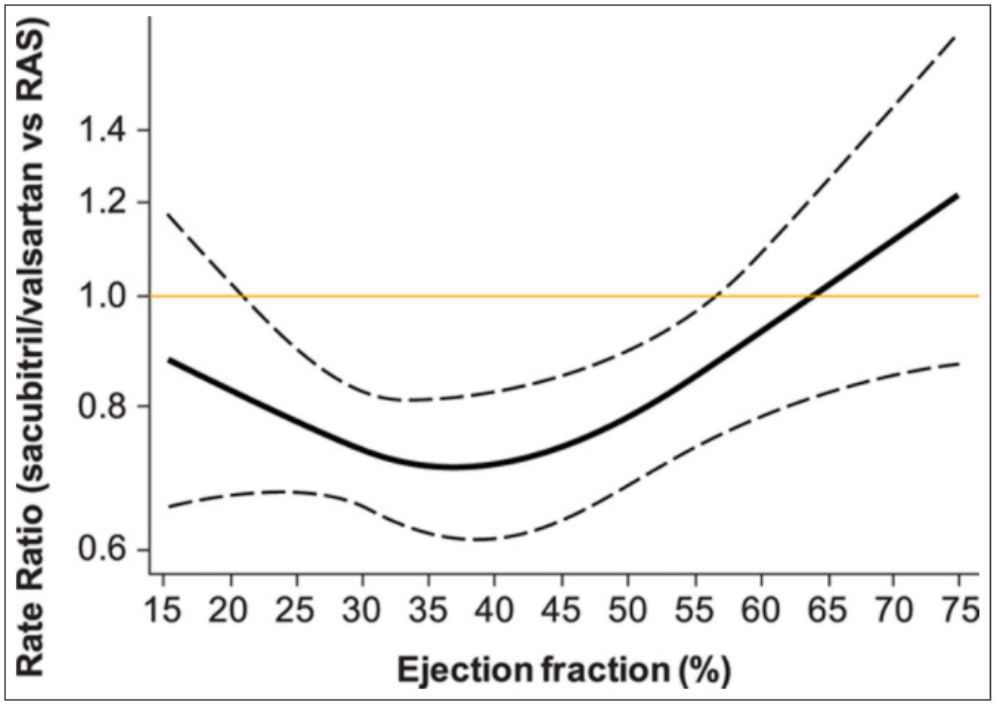
PARAGON-HF: Sacubitril/Valsartan

- 4822 patients with NYHA II-IV HF, LVEF ≥45%
- Primary outcome: composite of total hospitalization for HF and death from cardiovascular cause

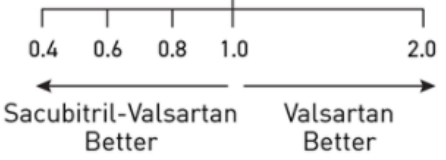


N Engl J Med. 2019;381:1609-20.

PARAGON-HF: Sacubitril/valsartan

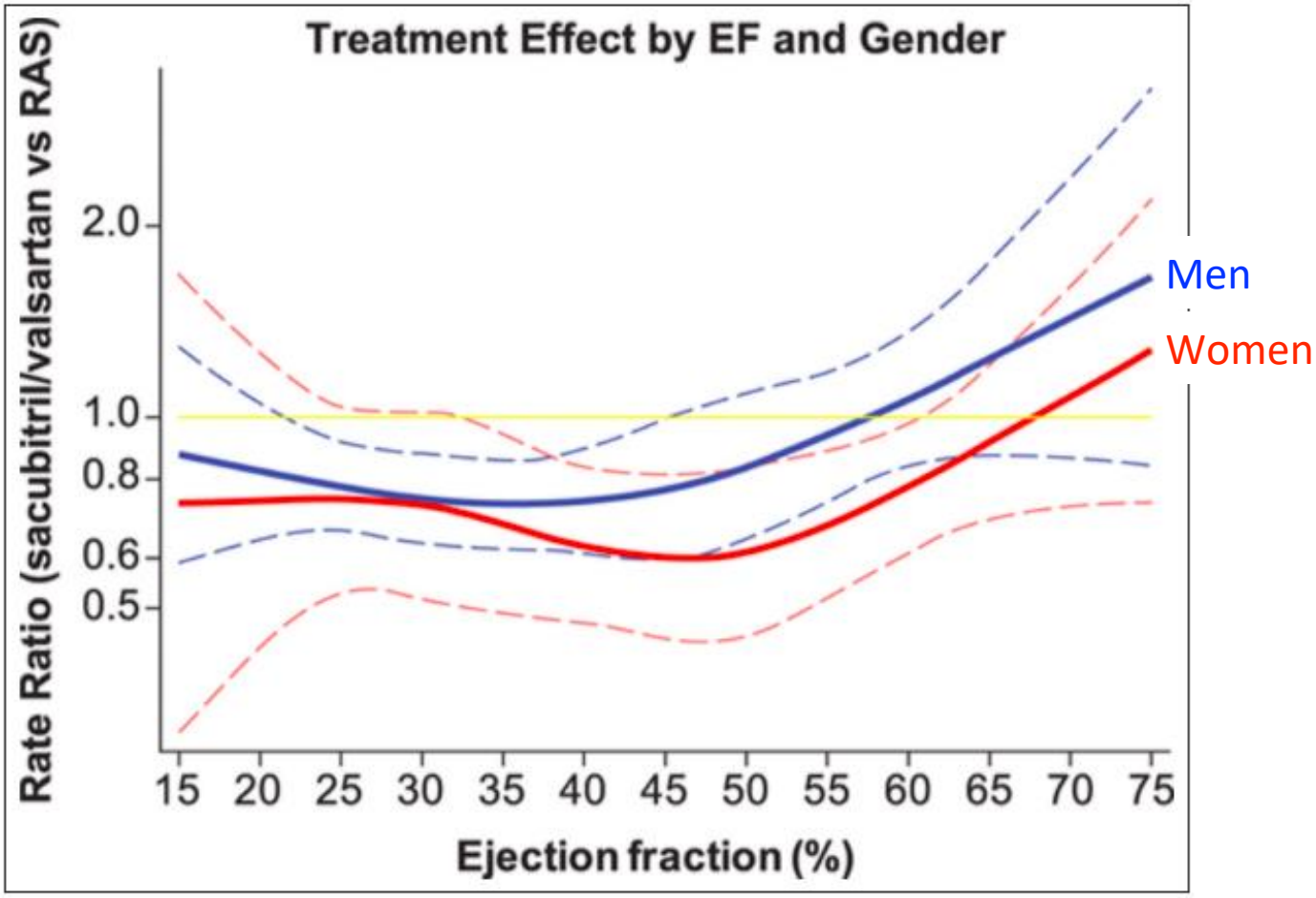


Subgroup	No. of Events/ No. of Patients	Rate Ratio (95% CI)
Left ventricular ejection fraction		
≤Median (57%)	1048/2495	0.78 (0.64-0.95)
>Median (57%)	855/2301	1.00 (0.81-1.23)



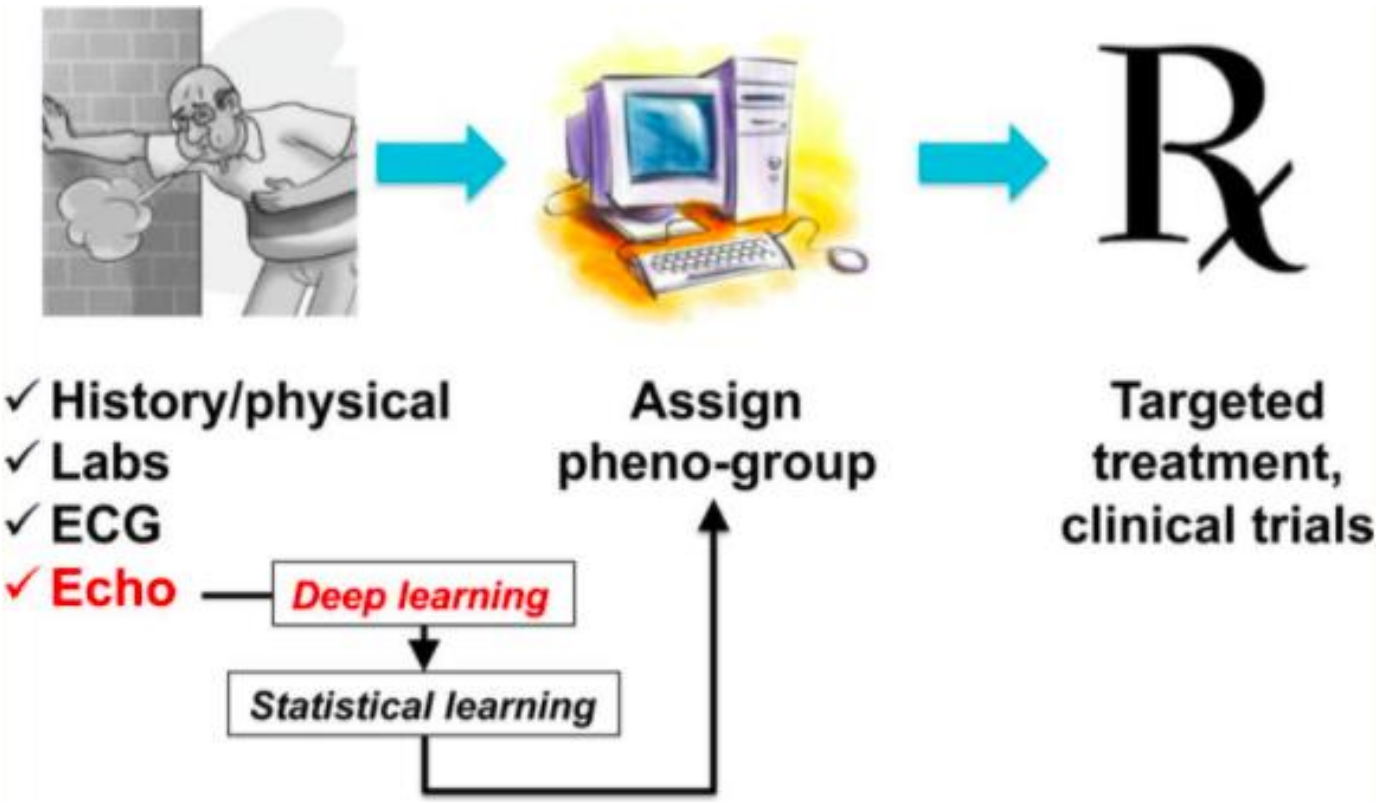
Circ. 2020;141(5):352-61.

PARAGON-HF: Sacubitril/Valsartan



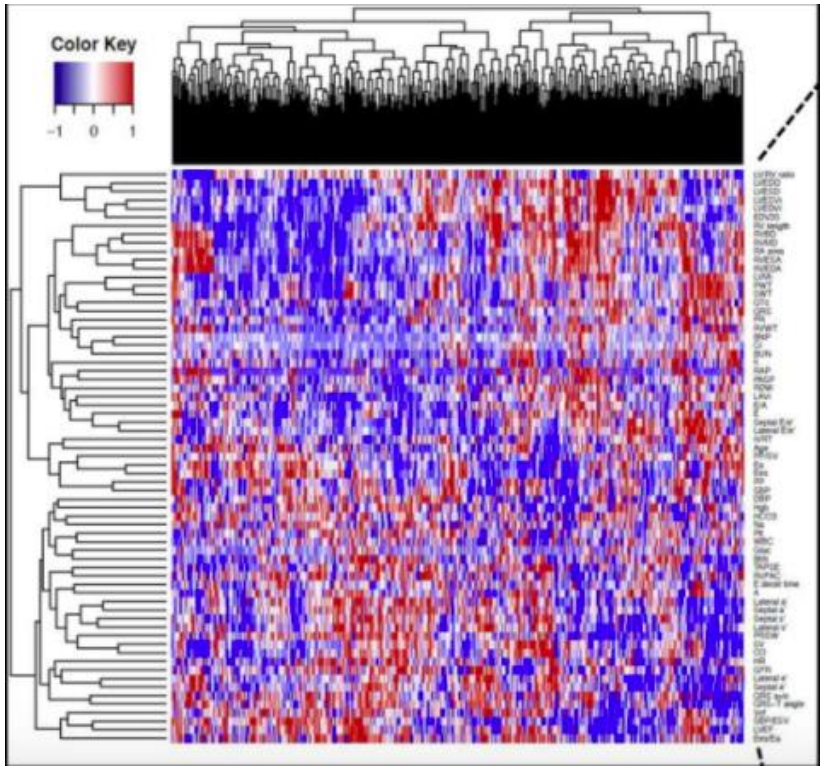
Circ. 2020;141(5):352-61.

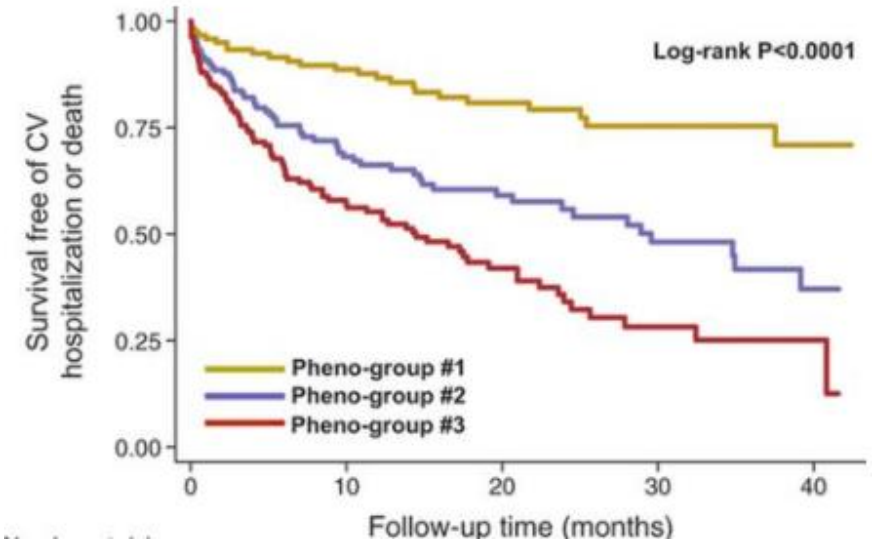
Next Steps: HFpEF Phenotypes



J Cardiovasc Trans Res. 2017;10(3):233-44.

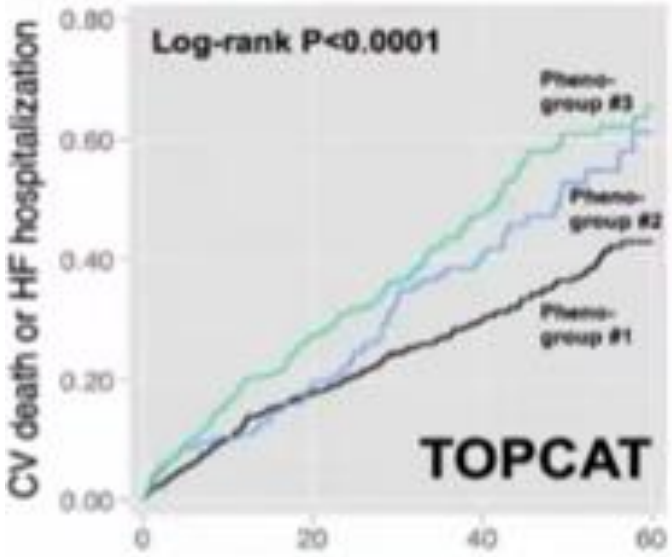
HFpEF Phenotypes





J Cardiovasc Trans Res. 2017;10(3):233-44.

HFpEF Phenotypes

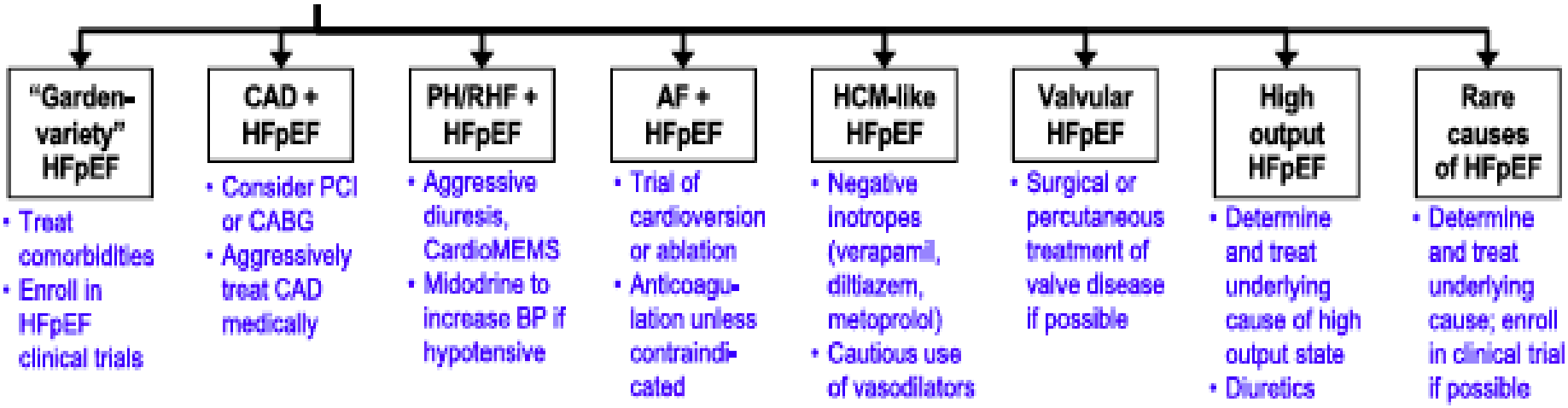


- **GROUP I:** **BNP deficiency syndrome**
  - Least cardiac remodeling
  - Lowest BNP
- **GROUP 2:** **Extreme metabolic syndrome**
  - Most severely impaired myocardial relaxation
  - Highest prevalence of diabetes
- **GROUP 3:** **RV failure/cardio-abdominal-renal syndrome**
  - Most severe cardiac and electrical remodeling
  - Highest prevalence of renal dysfunction

J Cardiovasc Trans Res. 2017;10(3):233-44.
Circ. 2014; 131(3):267-79.

HFpEF Phenotypes

- Etiology/pathophysiology phenotypes



Curr Treat Options Cardio Med. 2019;21(4):20.

Take Home Points

- HFpEF is a heterogenous syndrome driven by comorbidities
- Diastolic dysfunction ≠ HFpEF
- Diagnosis is challenging. Use the H2FPEF Score.
- Dynamic hemodynamic testing may be needed when considering HFpEF diagnosis
- Look for coronary artery disease in patients with HFpEF
- Categorize patients into clinical phenotypes to help determine the best management strategy

Next Webinar:

HHP/HPH Community Webinar:

COVID-19 Updates

Thursday, August 5, 2021

TBD

Thank you!

- A recording of the meeting will be available afterwards.
- Unanswered question?
  - Contact us at info@hawaiihealthpartners.org

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