CHF
"Back to the Basics"

BY:

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DAYTON/TROY, OH

MSUCOM 2006

2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

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EXPERT CONSENSUS DECISION PATHWAY

2023 ACC Expert Consensus Decision Pathway on Management of Heart Failure With Preserved Ejection Fraction

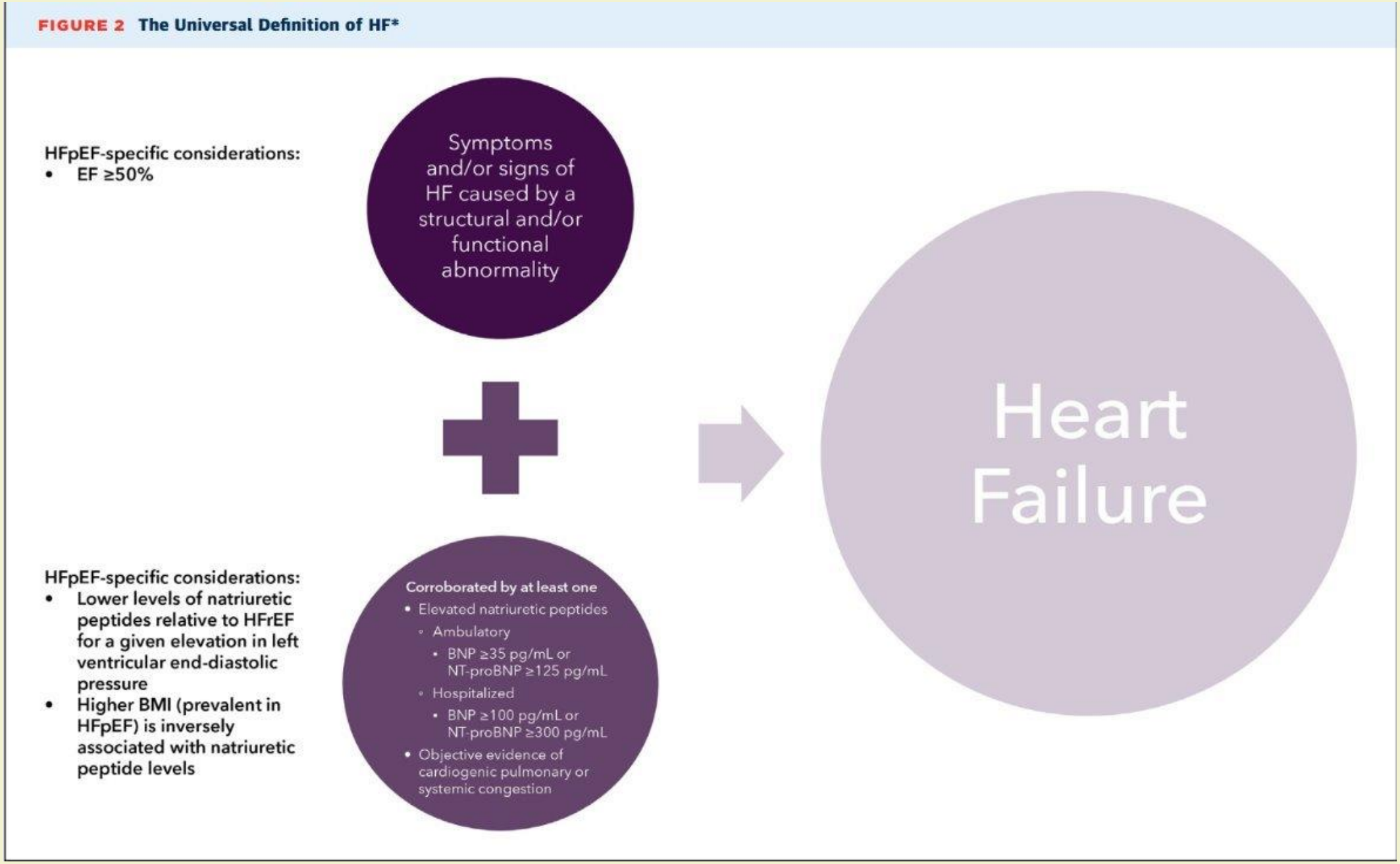
A Report of the American College of Cardiology Solution Set Oversight Committee

- Heart Failure Trends:
  - "Growing Health and Economic burden"
    - Due to an aging population
  - Total Deaths in US: 275,000 (2009) to 310,000 (2024)
  - 2013--> 2017: 26% increase in HF hospitalization and number of patient hospitalized.
  - Decreased Incidence of HF

Back to Basics

- Structural or function cardiac abnormality that causes:
  - "Increased Cardiac Filling Pressure and/or reduced cardiac output"
    - Elevated BNP, Echocardiogram findings, invasive testing
- Mixed "potpourri" of causes and treatment
- There is no single test to diagnose.
  - BNP is not the "end all, be all" for CHF
  - Basically - CHF still remains a clinical diagnosis.

FIGURE 2 **The Universal Definition of HF***



- Risks factors:
  - HTN
  - Myocardial Infarctions
  - Valvular Heart disease.
    - Aortic Stenosis/Regurgitation
    - Mitral regurgitations/Stenosis
  - Obesity
  - DM2
  - Aging

Table 5. Other Potential Nonischemic Causes of HF (Table view)

Cause	Reference
Chemotherapy and other cardiotoxic medications	23–25
Rheumatologic or autoimmune	26
Endocrine or metabolic (thyroid, acromegaly, pheochromocytoma, diabetes, obesity)	27–31
Familial cardiomyopathy or inherited and genetic heart disease	32
Heart rhythm–related (eg, tachycardia-mediated, PVCs, RV pacing)	33
Hypertension	34
Infiltrative cardiac disease (eg, amyloid, sarcoid, hemochromatosis)	21,35,36
Myocarditis (infectious, toxin or medication, immunological, hypersensitivity)	37,38
Peripartum cardiomyopathy	39
Stress cardiomyopathy (Takotsubo)	40,41
Substance abuse (eg, alcohol, cocaine, methamphetamine)	42–44

- Definitions
  - Preserved - "HFpEF" EF >/= 50% "my old thinking: Diastolic"
  - Reduced - "HFrEF" EF </= 40% "my old thinking: Systolic & Diastolic"
  - Mixed- "HFmrEF" "Mildly reduced" EF = 41-49%
  - Improved - EF improved to > 40%, when it was </= 40% prior

  - There is no more "Recovered" terminology

- Stages of Heart Failure:
  - Stage A: High risk for development of CHF "At Risk"
    - HTN, CAD, DM, Obesity
  - Stage B: Pre- CHF
    - Abnormal Cardiac structure/function
  - Stage C: Symptomatic CHF
  - Stage D: End stage CHF, Refractory CHF

Figure 1. **ACC/AHA Stages of HF.** The ACC/AHA stages of HF are shown. ACC indicates American College of Cardiology; AHA, American Heart Association; CVD, cardiovascular disease; GDMT, guideline-directed medical therapy; and HF, heart failure.

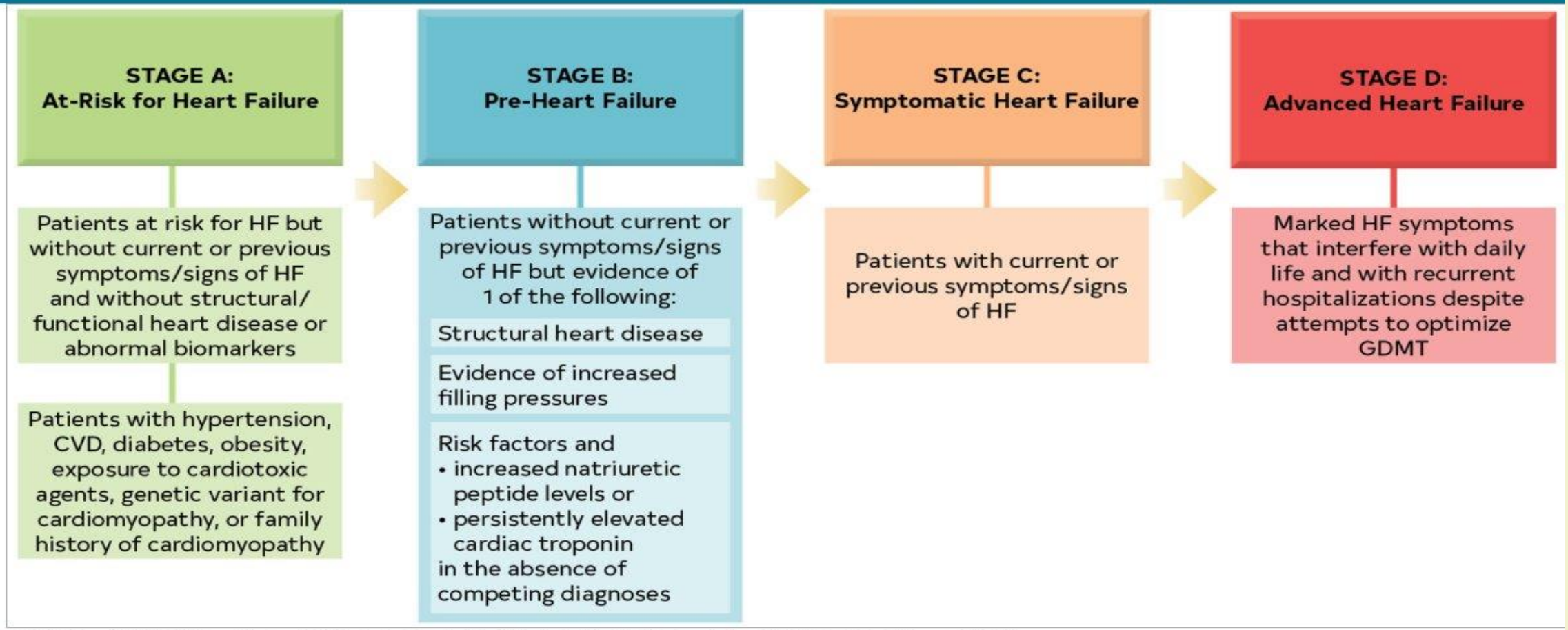


Figure 1. **ACC/AHA Stages of HF.** The ACC/AHA stages of HF are shown. ACC indicates American College of Cardiology; AHA, American Heart Association; CVD, cardiovascular disease; GDMT, guideline-directed medical therapy; and HF, heart failure.

Figure 2. **Trajectory of Stage C HF.** The trajectory of stage C HF is displayed. Patients whose symptoms and signs of HF are resolved are still stage C and should be treated accordingly. If all HF symptoms, signs, and structural abnormalities resolve, the patient is considered to have HF in remission. HF indicates heart failure; and LV, left ventricular. *Full resolution of... CLOSE

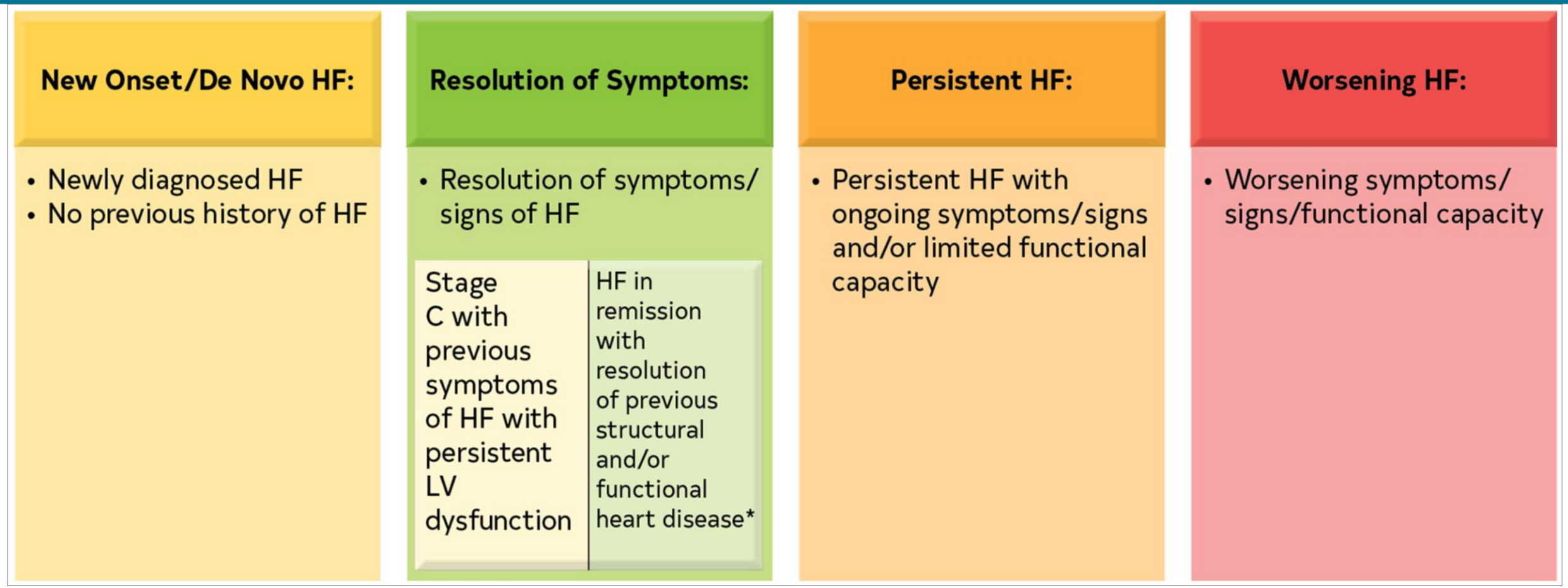
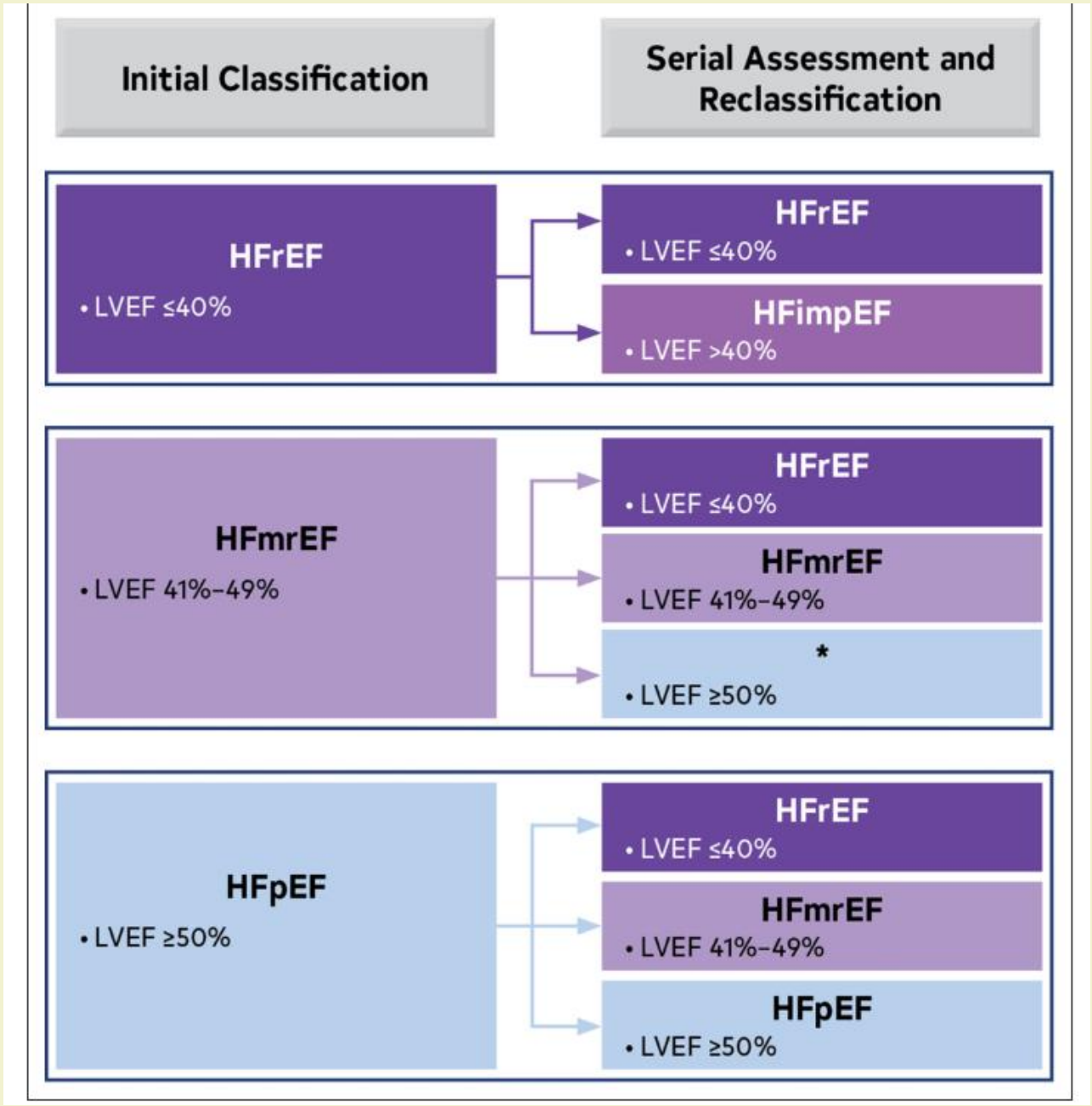


Figure 2. **Trajectory of Stage C HF.** The trajectory of stage C HF is displayed. Patients whose symptoms and signs of HF are resolved are still stage C and should be treated accordingly. If all HF symptoms, signs, and structural abnormalities resolve, the patient is considered to have HF in remission. HF indicates heart failure; and LV, left ventricular. *Full resolution of structural and functional cardiac abnormalities is uncommon.


Initial Classification
Serial Assessment and Reclassification
HFrEF
• LVEF ≤40%
HFrEF
• LVEF ≤40%
HFimpEF
• LVEF >40%
HFmrEF
• LVEF 41%–49%
HFrEF
• LVEF ≤40%
HFmrEF
• LVEF 41%–49%
*
• LVEF ≥50%
HFpEF
• LVEF ≥50%
HFrEF
• LVEF ≤40%
HFmrEF
• LVEF 41%–49%
HFpEF
• LVEF ≥50%

NYHA Class	Level of Clinical 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 on any physical activity without discomfort. Symptoms at rest can be present. If any physical activity is undertaken, discomfort is increased.

- Remembers:
  - Can move back and forward in a NYHC Class Scale.
  - You CANNOT move backwards on Stages of Heart Failure.
    - When a patient become a Class C, they cannot go backwards.

  - Examples:
    - HFpEF Class C, NYHC Stage 1
    - HFpEF Class C, NYHC Stage 2,3,4

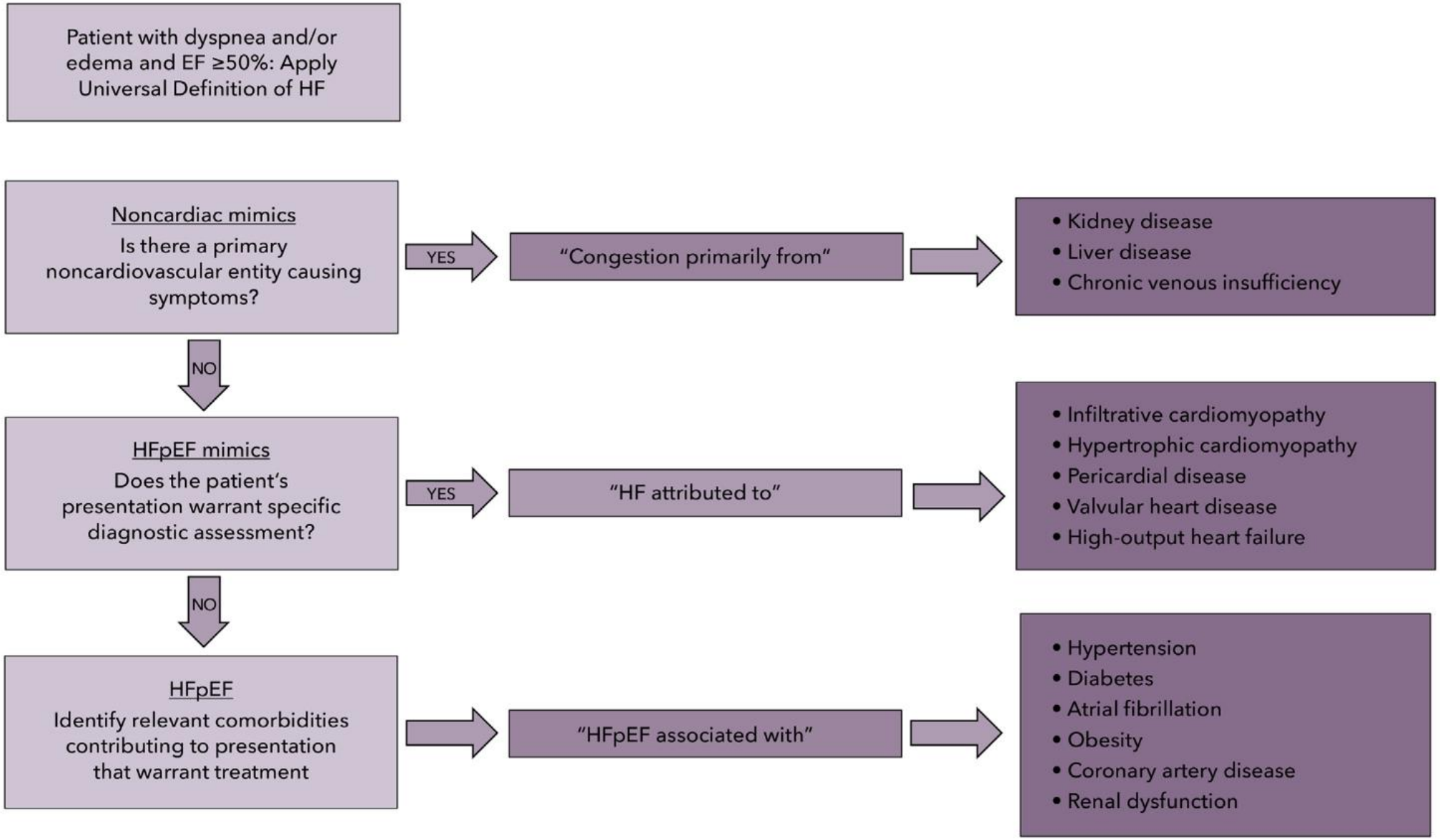
To help assist CHF diagnosis:

- Complete History and Physical
  - Family History
  - Do they have a history of cardiomyopathy?

Symptoms:
- SOB at rest or with exertion
- Decrease in exercise capacity
- Orthopnea
- Paroxysmal nocturnal dyspnea or nocturnal cough
- Swelling
- Ascites or scrotal edema

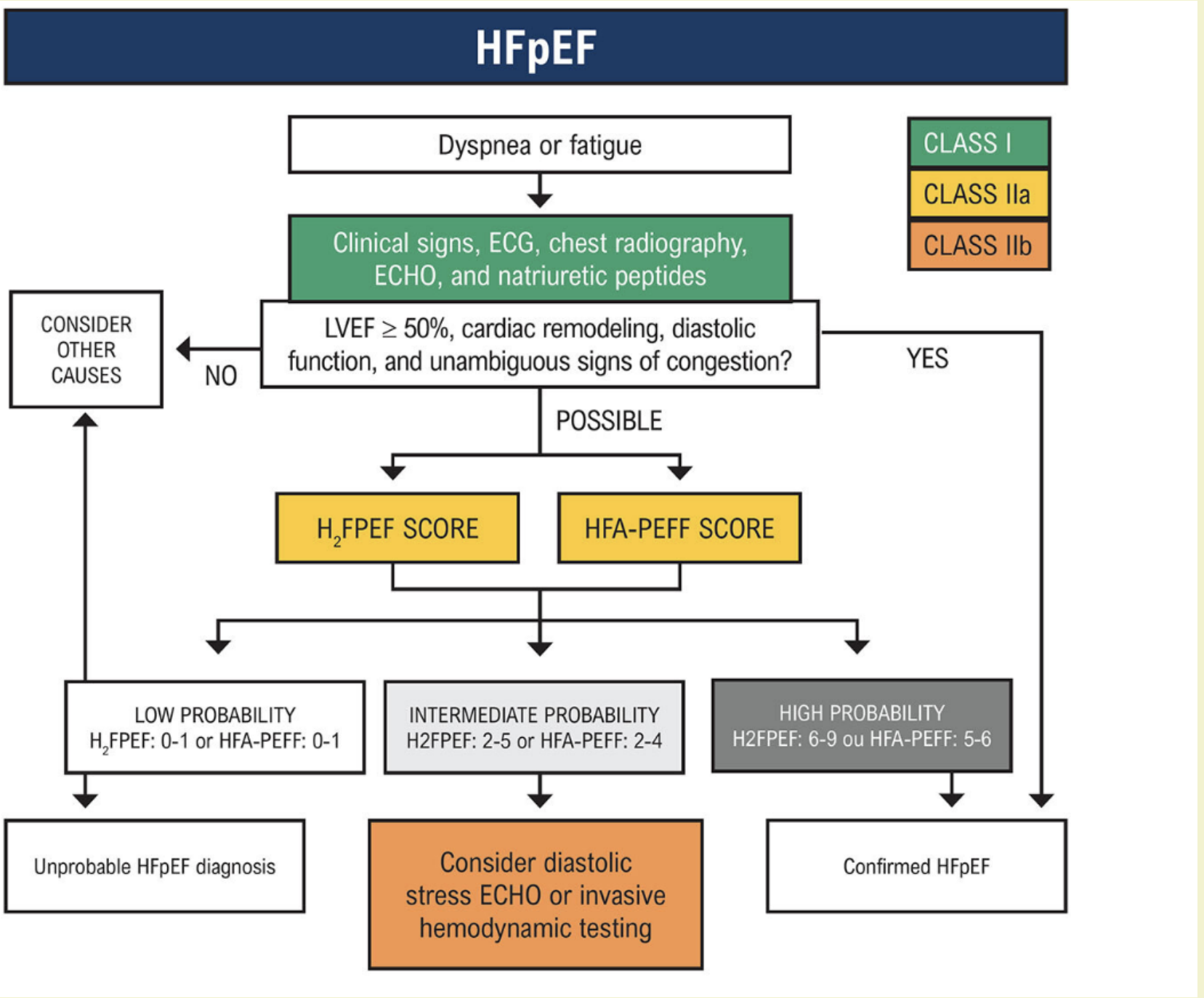
Other Symptoms:
- Early Satiety,
- Wheezing, Coughing
- Unexplained fatigue
- Confusion/delirium

FIGURE 8 **Stepwise Approach to Assessment of Individuals With Shortness of Breath and/or Edema**



- Physical Exam
  - JVD
  - S3
  - Hepato-Jugular reflux
  - Ascites
  - Edema

  - BUT – remembers is that the HPI is also significantly important.


HFpEF
Dyspnea or fatigue
Clinical signs, ECG, chest radiography, ECHO, and natriuretic peptides
LVEF ≥ 50%, cardiac remodeling, diastolic function, and unambiguous signs of congestion?
NO
CONSIDER OTHER CAUSES
YES
POSSIBLE
H2FPEF SCORE
HFA-PEFF SCORE
LOW PROBABILITY
H2FPEF: 0-1 or HFA-PEFF: 0-1
INTERMEDIATE PROBABILITY
H2FPEF: 2-5 or HFA-PEFF: 2-4
HIGH PROBABILITY
H2FPEF: 6-9 ou HFA-PEFF: 5-6
Unprobable HFpEF diagnosis
Consider diastolic stress ECHO or invasive hemodynamic testing
Confirmed HFpEF
CLASS I
CLASS IIa
CLASS IIb

Prior to completion, confirm patient has exertional dyspnea and LVEF > 40%.

Enter the points in the fields to the right for all conditions that apply to the patient.

H_2	Heavy	Body mass index > 30 kg/m²	+2	
	Hypertensive	On > 2 anti-hypertensives	+1	
F	Atrial Fibrillation	Paroxysmal or Persistent AF	+3	
P	Pulmonary Hypertension	RVSP > 35 mmHg	+1	
E	Elder	Age > 60 years	+1	
F	Filling Pressure	E/e' > 9	+1	
		Score (Sum of above numbers)		

Consider sending high probability HFpEF patients for further evaluation

A score of	3	4	5	6+
Indicates a HFpEF probability of	>50%	>70%	>80%	>90%

- BNP/NTBNP
  - When to order:
    - When CHF is suspect "SOB"
    - Chronic HF - Helps with risk stratification
    - Screening for patient who are risk for developing CHF "Stage A, 1 patients"
    - Admission into the hospital for CHF
    - Upon discharge from the hospital for CHF

Also, a negative BNP does not exclude CHF!!!

-Always use clinic judgement

- Ex: Morbid Obesity can sometimes give low BNP levels

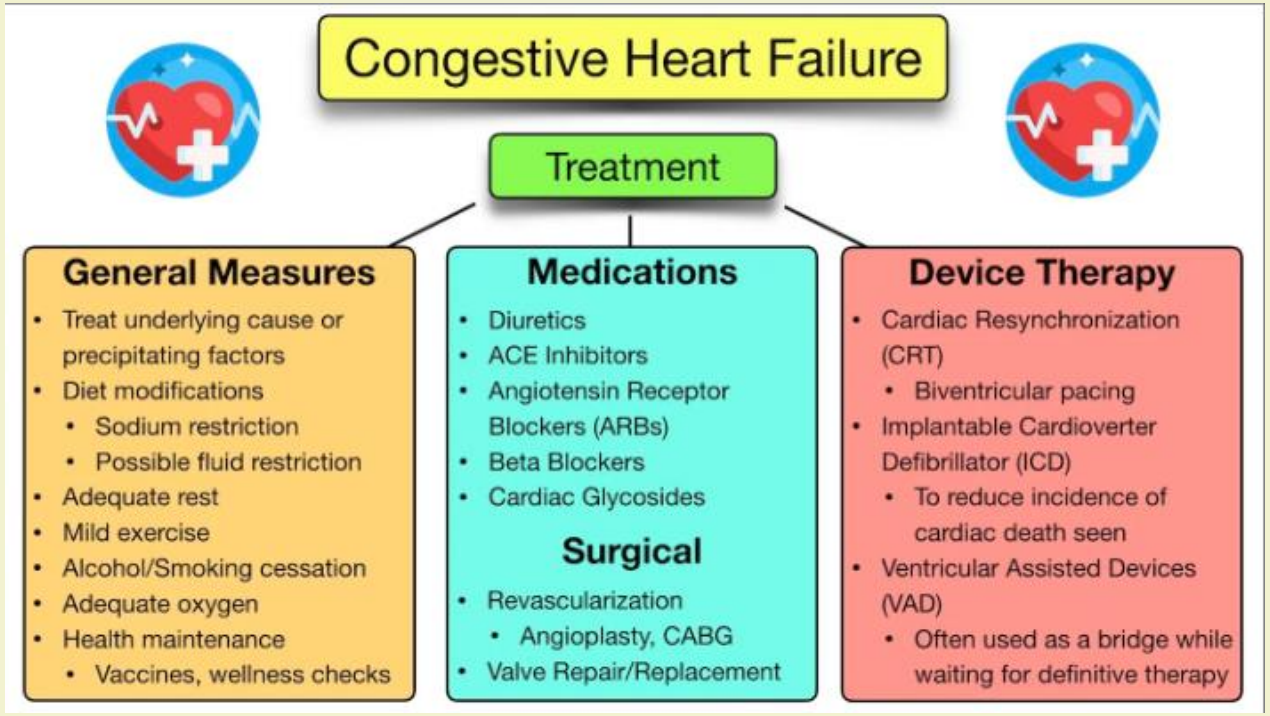
Table 6. Selected Potential Causes of Elevated Natriuretic Peptide Levels[50–53] (Table view)

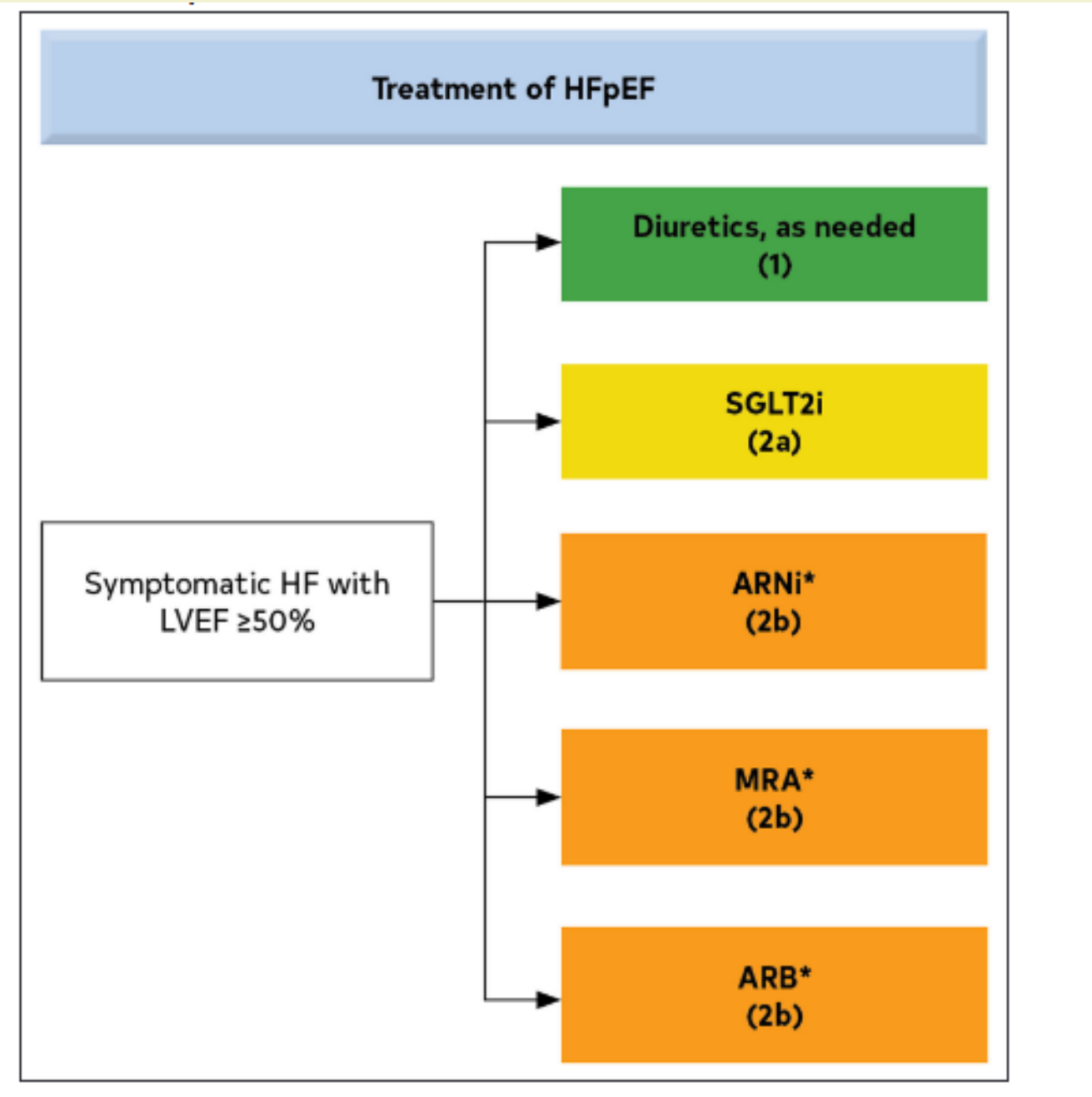
Cardiac
HF, including RV HF syndromes
ACS
Heart muscle disease, including LVH
VHD
Pericardial disease
AF
Myocarditis
Cardiac surgery
Cardioversion
Toxic-metabolic myocardial insults, including cancer chemotherapy
Noncardiac
Advancing age
Anemia
Renal failure
Pulmonary: Obstructive sleep apnea, severe pneumonia
Pulmonary embolism, pulmonary arterial hypertension
Critical illness
Bacterial sepsis
Severe burns

Also, a negative BNP does not exclude CHF!!!

- In general – Testing:
  - EKG
  - CXR
  - Echocardiogram
  - Labs:
    - CBC
    - BMP
    - BNP
    - UA
    - LFT
    - IRON
    - Thyroid studies.
  - Can consider other testing:
    - Stress testing
    - Cardiac MRI

Treatment


Congestive Heart Failure
Treatment
General Measures
Treat underlying cause or precipitating factors
Diet modifications
Sodium restriction
Possible fluid restriction
Adequate rest
Mild exercise
Alcohol/Smoking cessation
Adequate oxygen
Health maintenance
Vaccines, wellness checks
Medications
Diuretics
ACE Inhibitors
Angiotensin Receptor Blockers (ARBs)
Beta Blockers
Cardiac Glycosides
Surgical
Revascularization
Angioplasty, CABG
Valve Repair/Replacement
Device Therapy
Cardiac Resynchronization (CRT)
Biventricular pacing
Implantable Cardioverter Defibrillator (ICD)
To reduce incidence of cardiac death seen
Ventricular Assisted Devices (VAD)
Often used as a bridge while waiting for definitive therapy

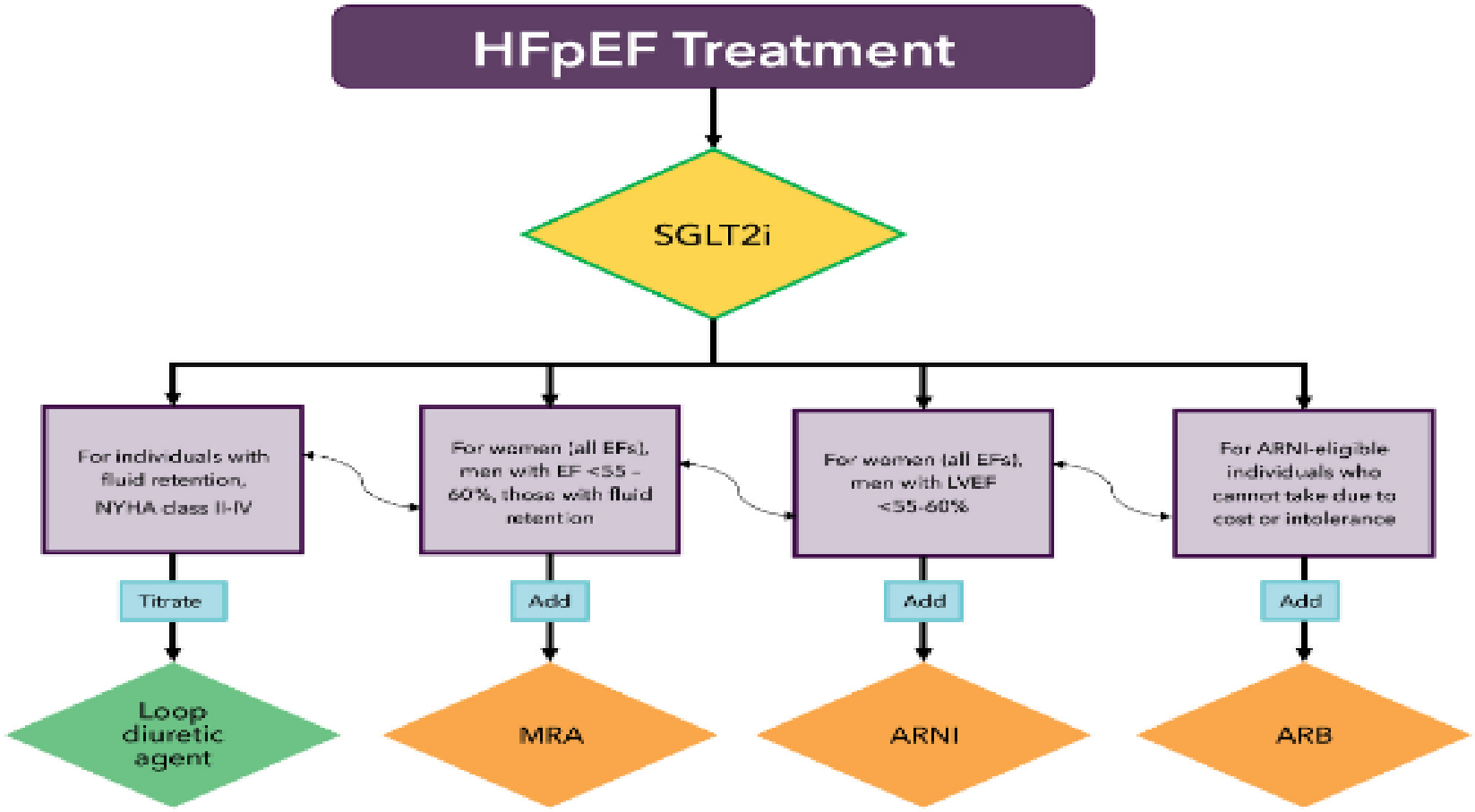

Treatment of HFpEF
Symptomatic HF with LVEF ≥50%
Diuretics, as needed (1)
SGLT2i (2a)
ARNi* (2b)
MRA* (2b)
ARB* (2b)

EXPERT CONSENSUS DECISION PATHWAY

2023 ACC Expert Consensus Decision Pathway on Management of Heart Failure With Preserved Ejection Fraction

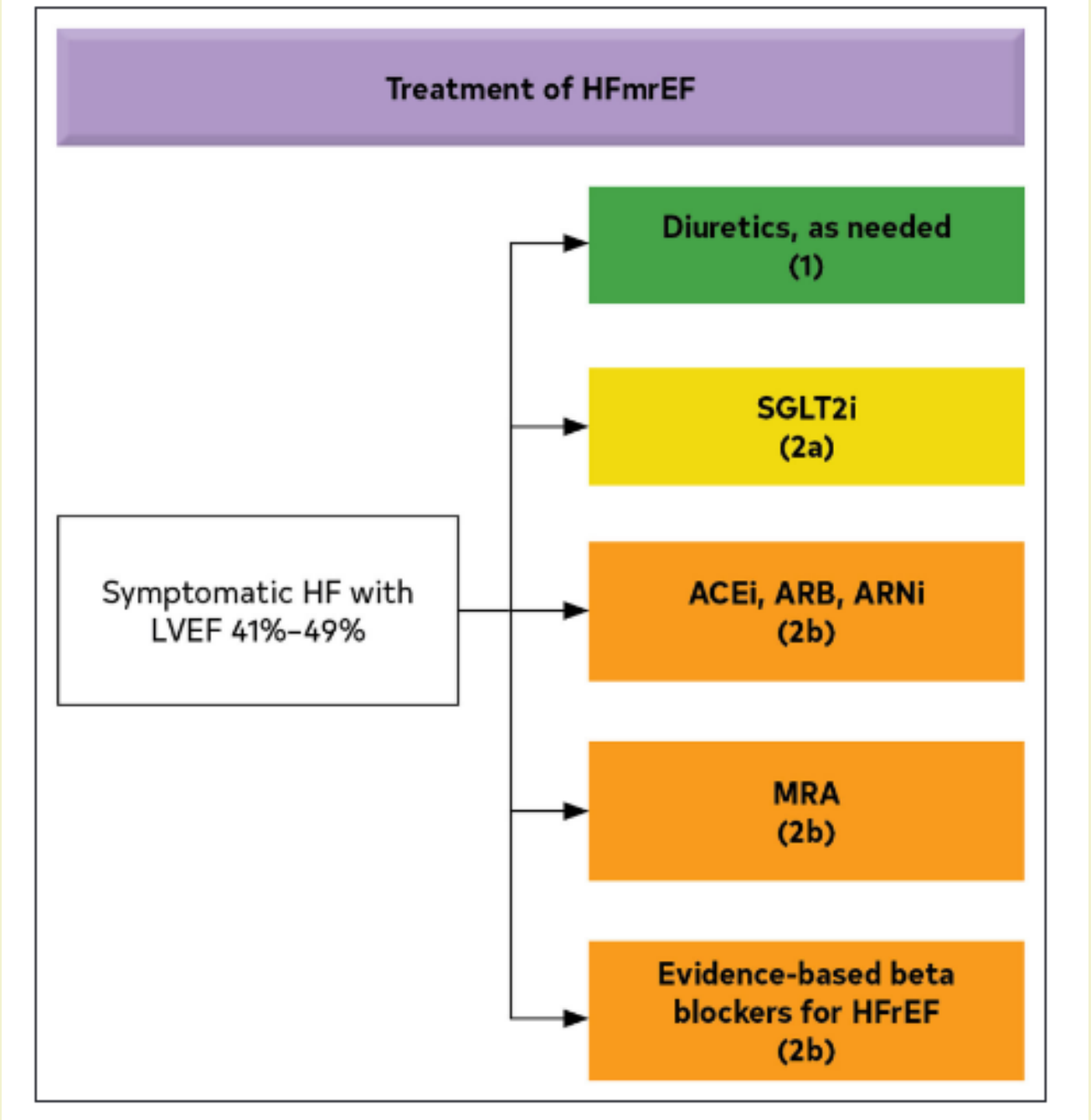
A Report of the American College of Cardiology Solution Set Oversight Committee

FIGURE 9 Treatment Algorithm for Guideline-Directed Medical Therapy in HFpEF[a]

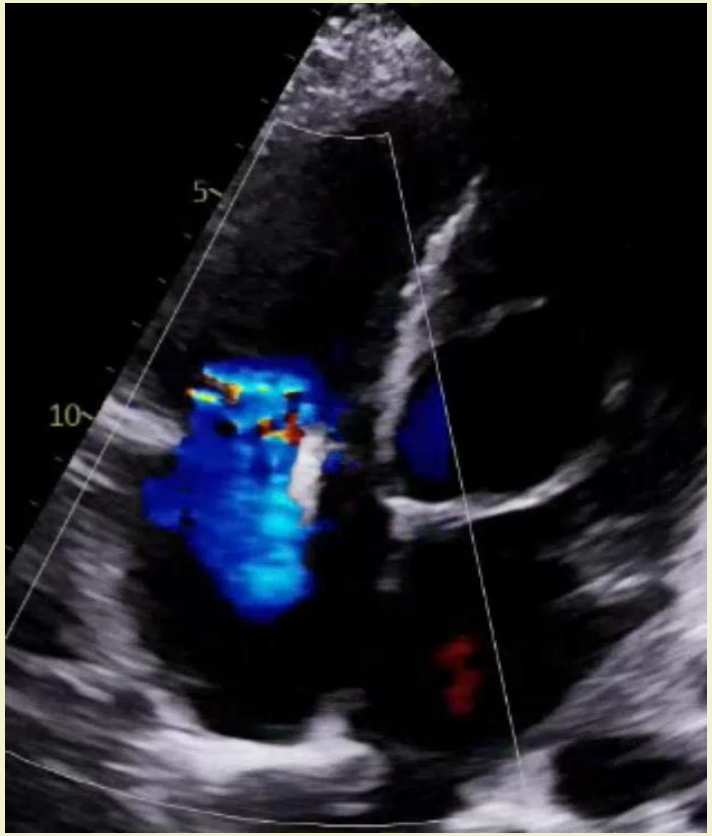


[a]Green color identifies a Class 1 therapy from clinical practice guidelines,[14] yellow color indicates a Class 2a therapy, and orange color denotes a Class 2b therapy. SGLT2is receive a Class 2a indication in the 2022 AHA/ACC/HFSA HF Guidelines,[14] but the benefit, now confirmed in 2 randomized trials,[4,5,6,7] suggests that SGLT2is may receive a stronger class of recommendation in future guidelines, and thus the box is shaded yellow with a green border. AF — atrial fibrillation; ARB — angiotensin receptor blocker; ARNI — angiotensin receptor–neprilysin inhibitor; EF — ejection fraction; HFpEF — heart failure with preserved ejection fraction; LVEF — left ventricular ejection fraction; MRA — mineralocorticoid antagonist; NYHA — New York Heart Association; SGLT2i — sodium–glucose cotransporter 2 inhibitor.

Treatment

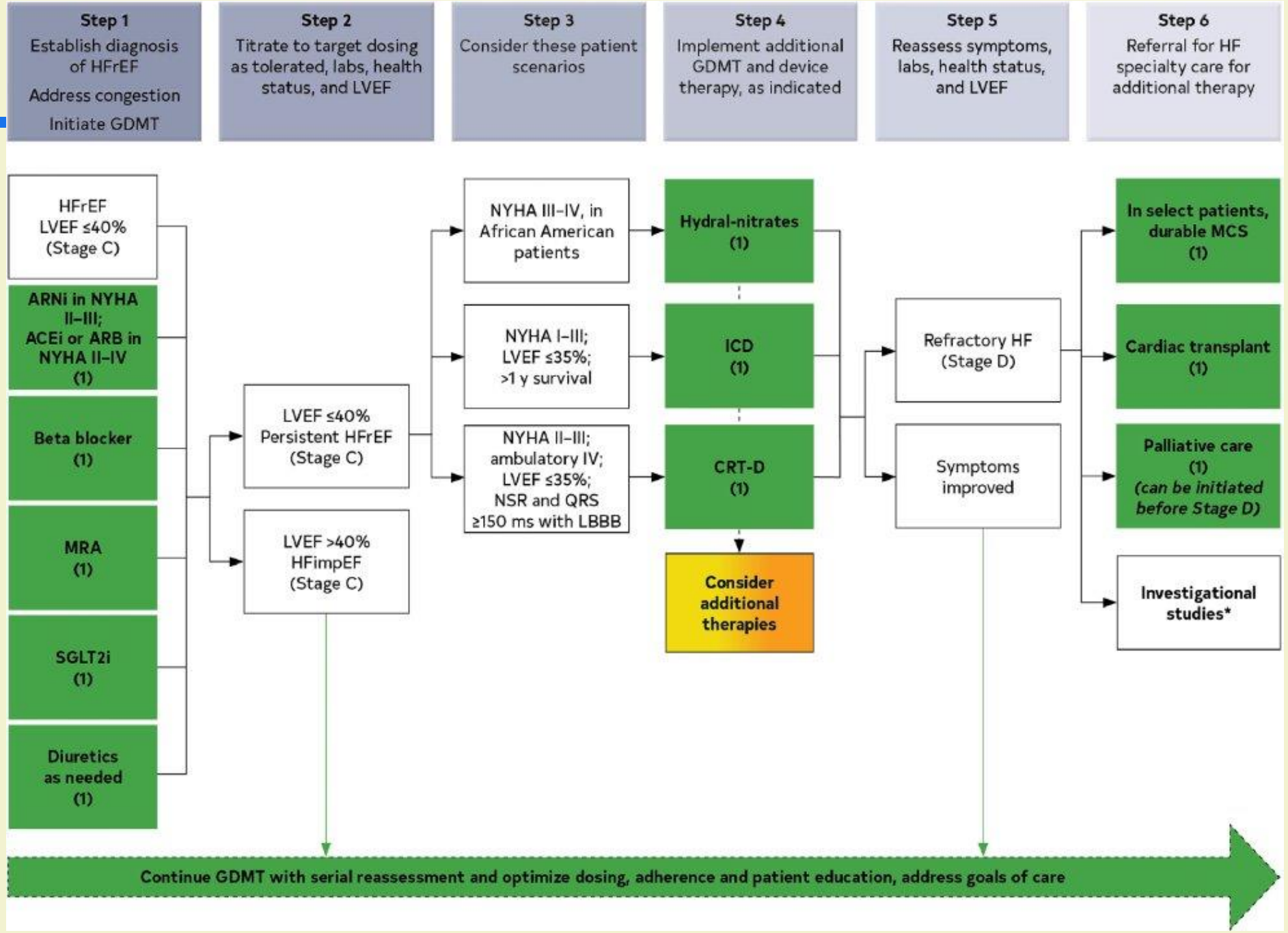

Treatment of HFmrEF
Symptomatic HF with LVEF 41%–49%
Diuretics, as needed (1)
SGLT2i (2a)
ACEi, ARB, ARNi (2b)
MRA (2b)
Evidence-based beta blockers for HFrEF (2b)

HFrEF



THE 4 PILLARS OF GUIDELINE DIRECTED MEDICAL THERAPY (GDMT)

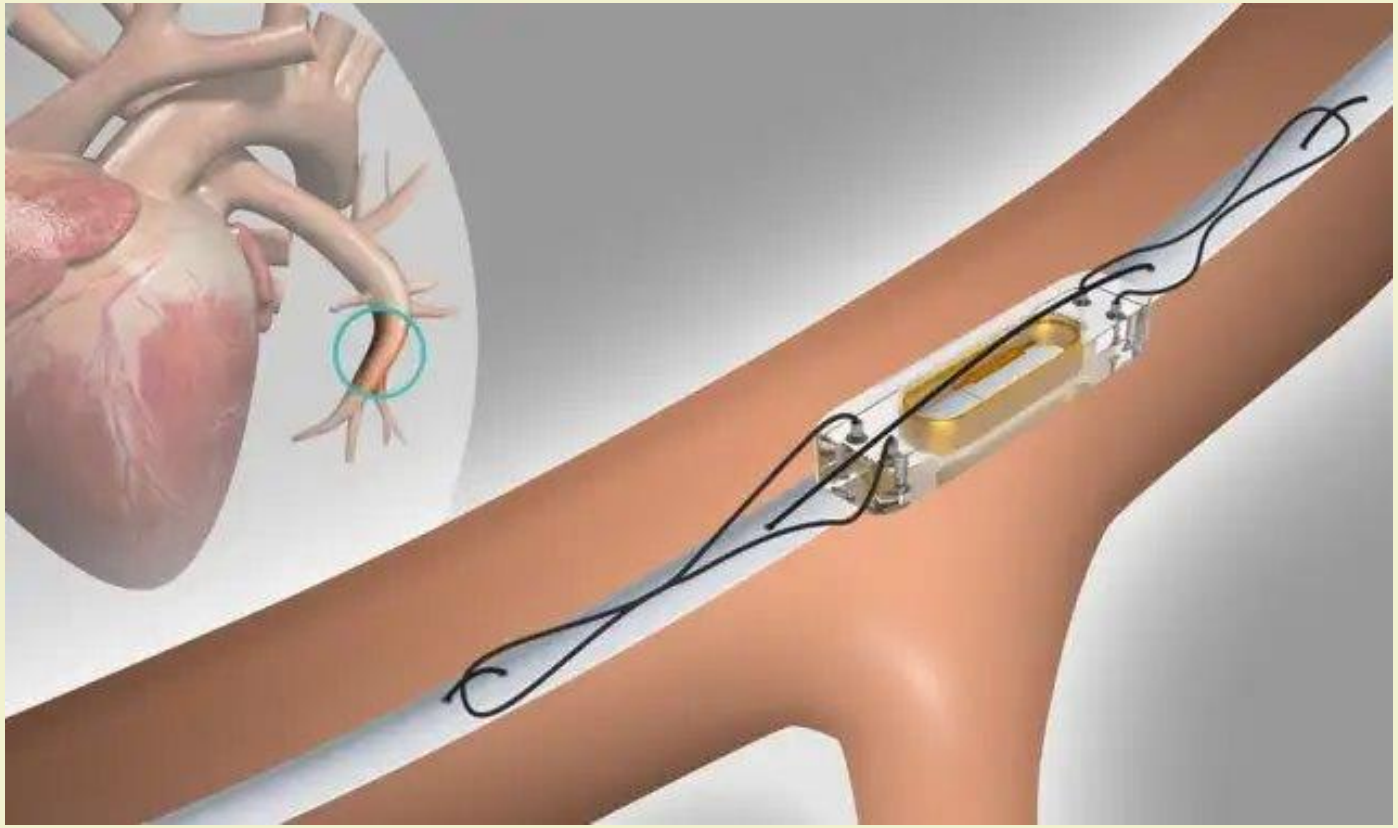
- ARNI (Sacubitril/Valsartan)
- Beta-blockers (Carvedilol, Metoprolol Succinate, Bisoprolol)
- MRA (Spironolactone, Eplerenone)
- SGLT2i (Dapagliflozin/Farxiga, Empagliflozin/Jardiance, Sotaglifozin/Inpefa)

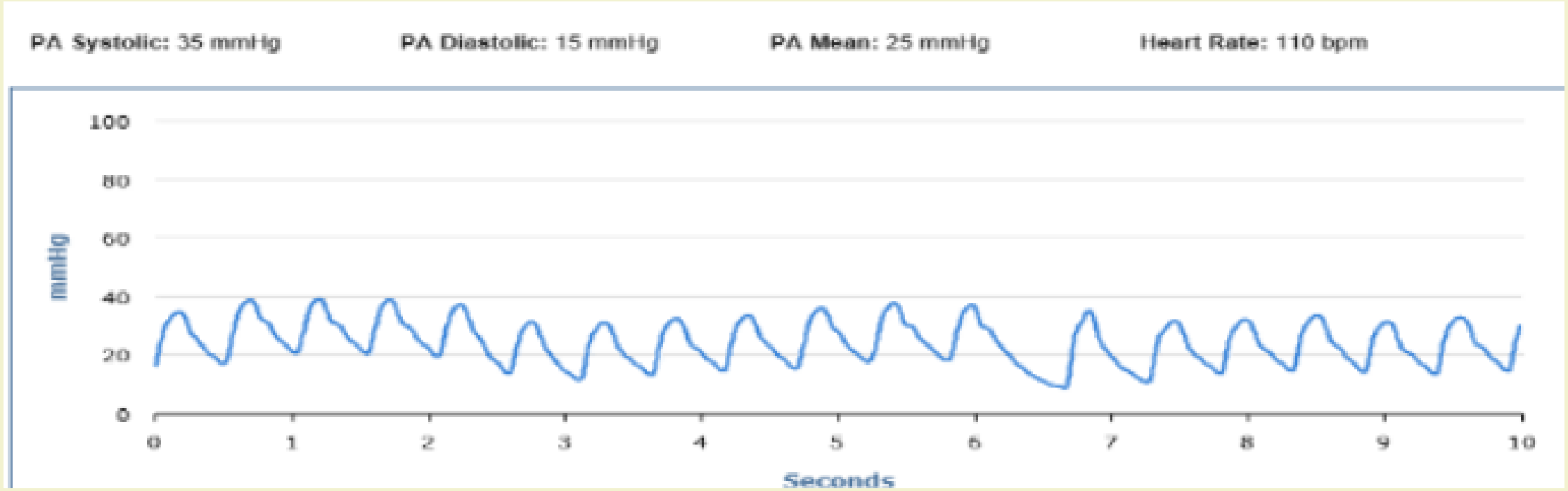

Step 1
Establish diagnosis of HFrEF
Address congestion
Initiate GDMT
Step 2
Titrate to target dosing as tolerated, labs, health status, and LVEF
Step 3
Consider these patient scenarios
Step 4
Implement additional GDMT and device therapy, as indicated
Step 5
Reassess symptoms, labs, health status, and LVEF
Step 6
Referral for HF specialty care for additional therapy
HFrEF LVEF ≤40% (Stage C)
ARNi in NYHA II–III; ACEi or ARB in NYHA II–IV (1)
Beta blocker (1)
MRA (1)
SGLT2i (1)
Diuretics as needed (1)
LVEF ≤40% Persistent HFrEF (Stage C)
LVEF >40% HFimpEF (Stage C)
NYHA III–IV, in African American patients
NYHA I–III; LVEF ≤35%; >1 y survival
NYHA II–III; ambulatory IV; LVEF ≤35%; NSR and QRS ≥150 ms with LBBB
Hydral-nitrates (1)
ICD (1)
CRT-D (1)
Consider additional therapies
Refractory HF (Stage D)
Symptoms improved
In select patients, durable MCS (1)
Cardiac transplant (1)
Palliative care (1) (can be initiated before Stage D)
Investigational studies*
Continue GDMT with serial reassessment and optimize dosing, adherence and patient education, address goals of care

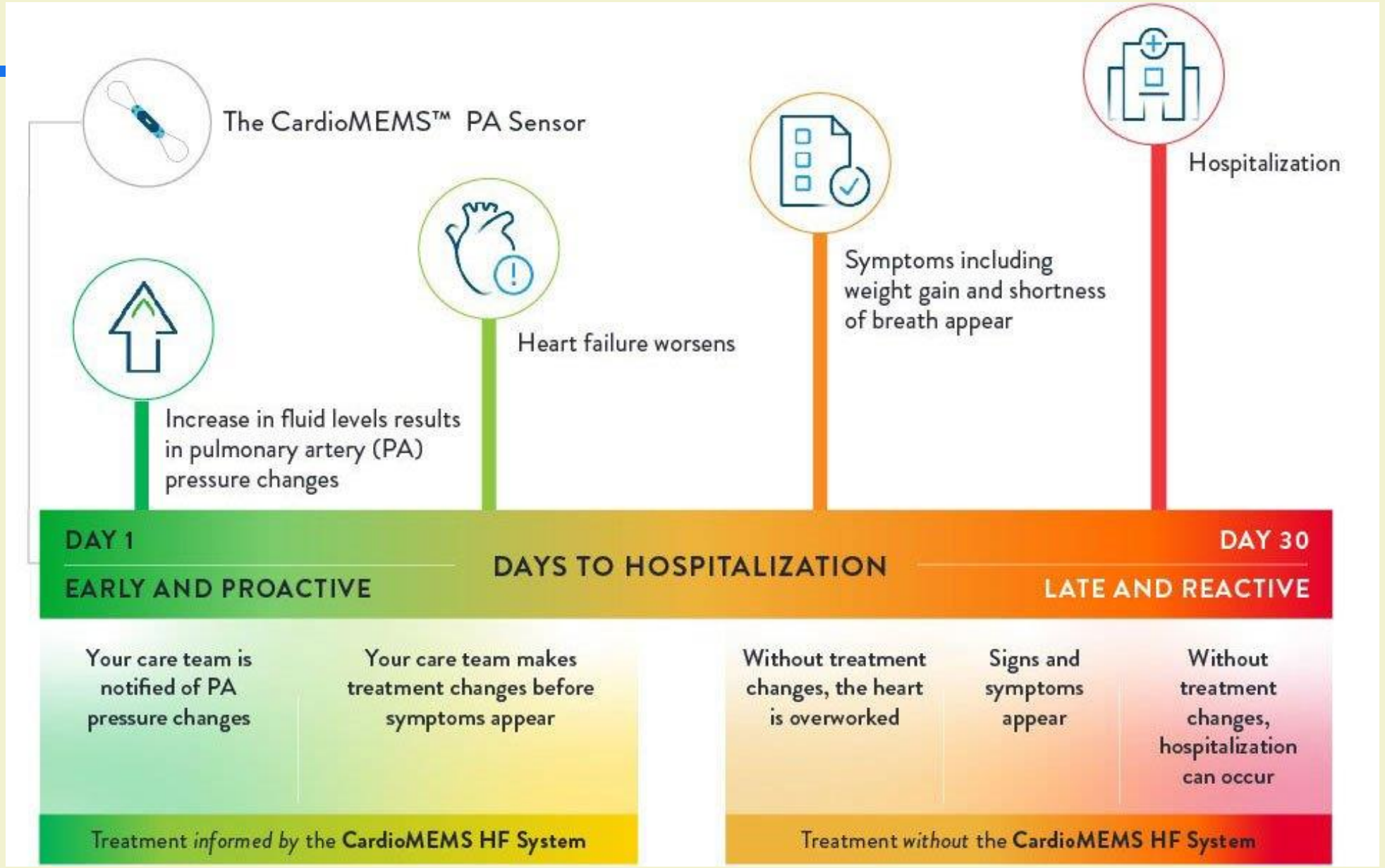
- With all these patients – Don't forget:
  - GDMT
  - DIET
    - Low Sodium
    - Fluid restrictions
  - Weight loss
  - Good HTN control
  - DM2 Management
  - OSA Evaluation!!

- Monitoring Devices:

CARDIOMEMS

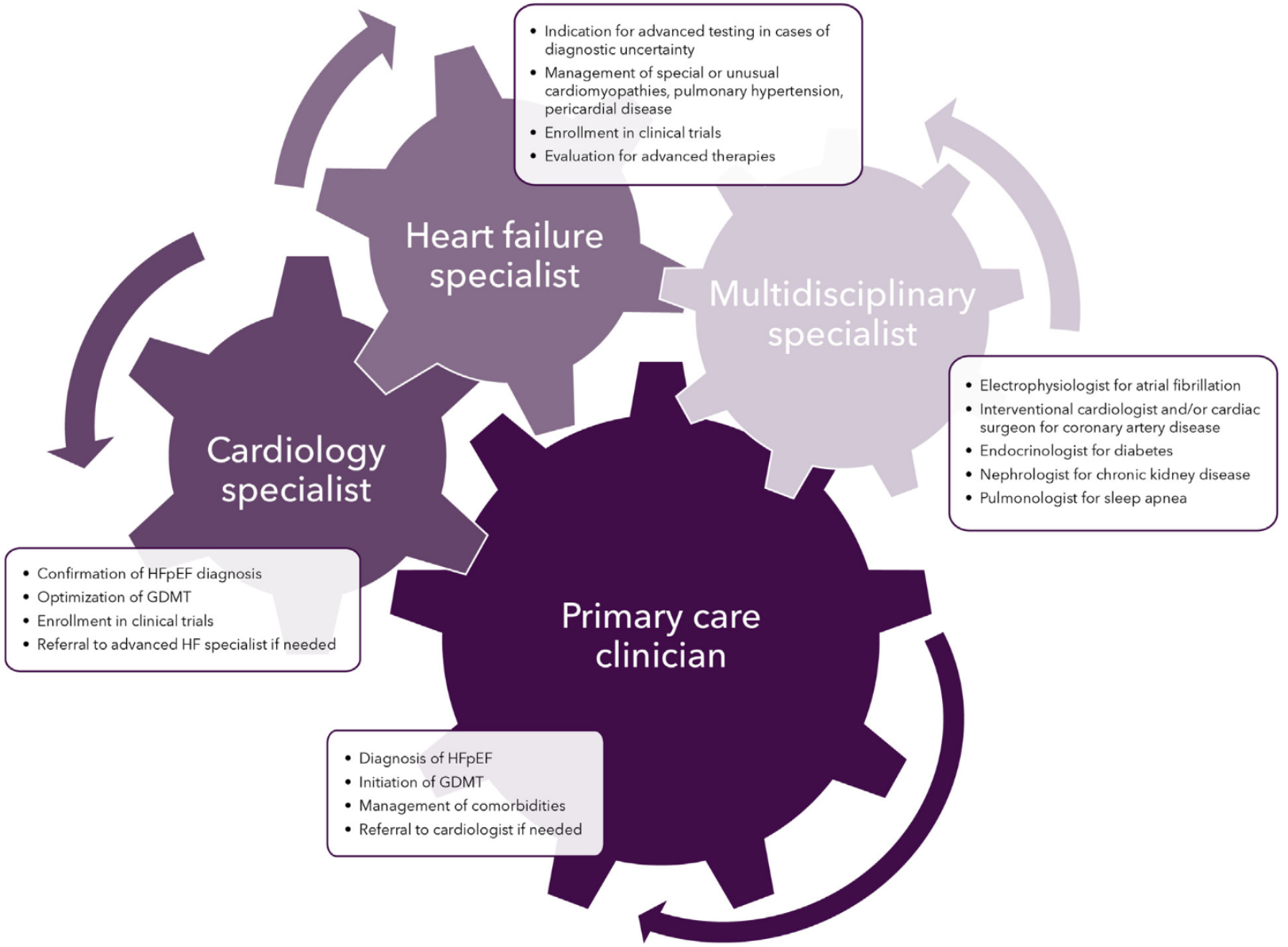



PA Systolic: 35 mmHg
PA Diastolic: 15 mmHg
PA Mean: 25 mmHg
Heart Rate: 110 bpm
100
80
60
40
20
0
mmHg
0
1
2
3
4
5
6
7
8
9
10
Seconds


The CardioMEMS™ PA Sensor
Increase in fluid levels results in pulmonary artery (PA) pressure changes
Heart failure worsens
Symptoms including weight gain and shortness of breath appear
Hospitalization
DAY 1
EARLY AND PROACTIVE
DAYS TO HOSPITALIZATION
DAY 30
LATE AND REACTIVE
Your care team is notified of PA pressure changes
Your care team makes treatment changes before symptoms appear
Without treatment changes, the heart is overworked
Signs and symptoms appear
Without treatment changes, hospitalization can occur
Treatment informed by the CardioMEMS HF System
Treatment without the CardioMEMS HF System

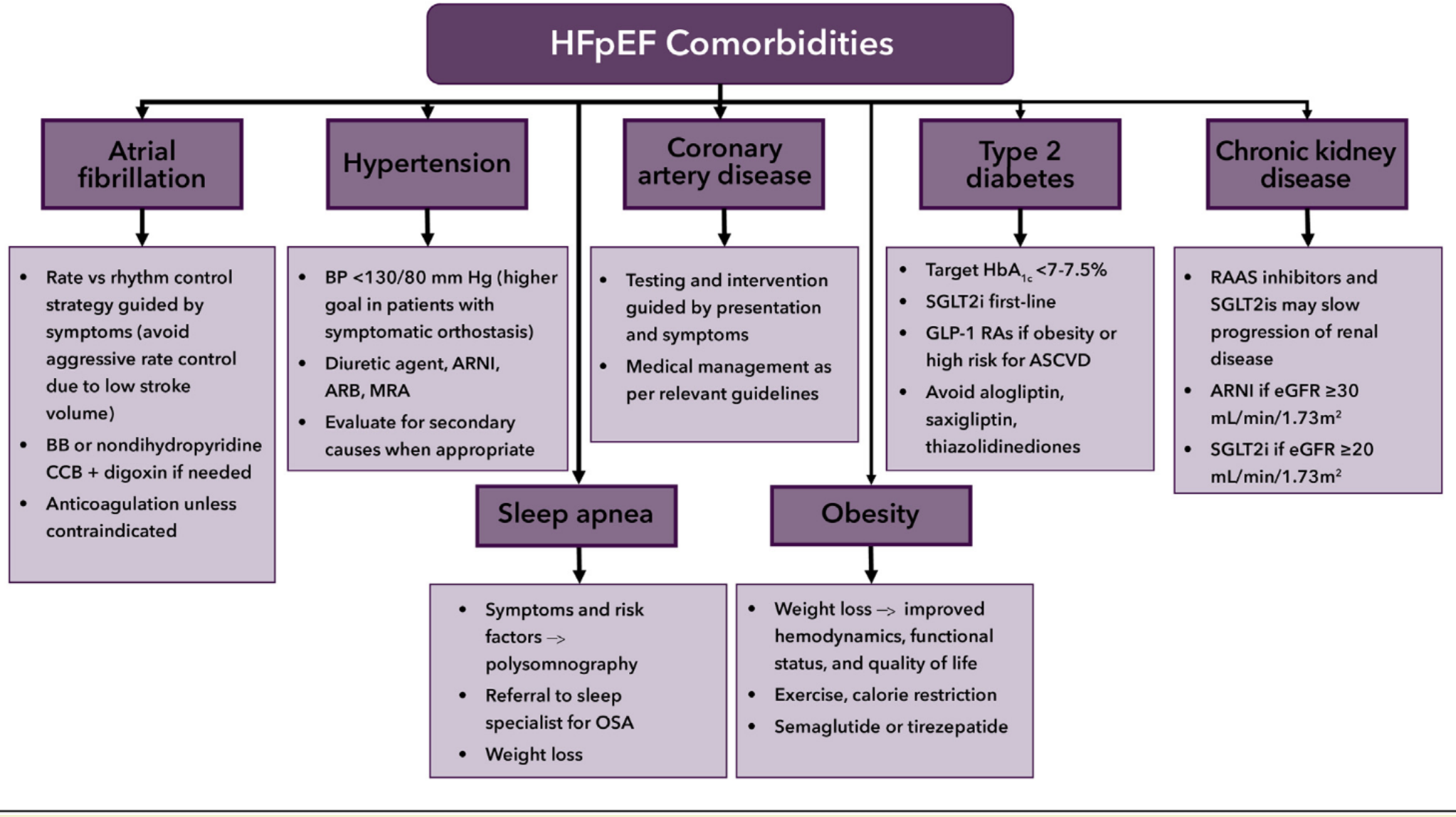

ZOLL
HEART
FAILURE
MANAGEMENT
SYSTEM (HFMS)*

FIGURE 1 Approach to HFpEF



Abbreviations: GDMT = guideline-directed medical therapy; HF = heart failure; HFpEF = heart failure with preserved ejection fraction.

FIGURE 11 **Management of Comorbidities Associated With HFpEF**



When to Refer a Patient with Suspected or Known HFpEF: Primary Care Clinician to Cardiovascular Specialist

Acronym to assist in decision making for cardiology referral: CHECK-IN

C — **Collaboration**

Need for specialist care to manage comorbidities, including AF, HTN, DM, CAD

H — **High-risk features**

HF hospitalizations, pulmonary hypertension, RV dysfunction

E — **Extensive evaluation needed**

Need for exercise testing, invasive hemodynamic assessment, CMR

C — **Cardiorenal syndrome**

K — **Knowledge of HFpEF mimics**

Valvular disease, HCM, amyloid, pericardial disease

–

I — **Increased need for diuretic agents**

N — **NYHA Class III or IV symptoms**

I NEED HELP (RECOGNIZING ADVANCED HF)

Mnemonic for referral to advanced HF care:

- Inotropes
- NYHA Class III-IV, elevated NPs
- End-organ dysfunction
- EF <20%
- Defibrillation
- >1 Hospitalization
- Escalating diuretic doses
- Low blood pressure
- Progressive intolerance of GDMT

When to Refer: Cardiovascular Specialist to Advanced Heart Failure Specialist

Acronym to assist in decision making for HF specialist referral: INHALE

I

In need of diagnosis

Lack of conventional HFpEF risk factors; exercise-intolerant-only phenotype

N

Nonresponsive to diuretic agents or medical therapy; Natriuretic peptides extremely high

Resistance to diuretic agents or medical therapy; progressive symptoms; NT-proBNP >3,000 pg/mL, BNP >1,000 pg/mL

H

Hospitalized frequently for HF

2 or more HF hospitalizations in the past year

A

Acute or chronic end-organ dysfunction

Worsening kidney or liver function; cardiac cachexia

L

Low blood pressure

Systolic blood pressure <100 mm Hg

E

Evidence of HFpEF mimics

Management of rare or unusual cardiomyopathies

Case Study:

- #1 Case Example:
  - 72Yo AA presents with SOB, lightheadedness. CHF was suspected. Echo ordered
  - PMHx: Carpal Tunnel
    - Dyslipidemia, OA, Gout
  - Exam: -JVD - Lower extremity edema
    - Labs: BNP: Pending
      - CR: 1.1, Hb: 17.3,


5
10
15
80
30.2 fps

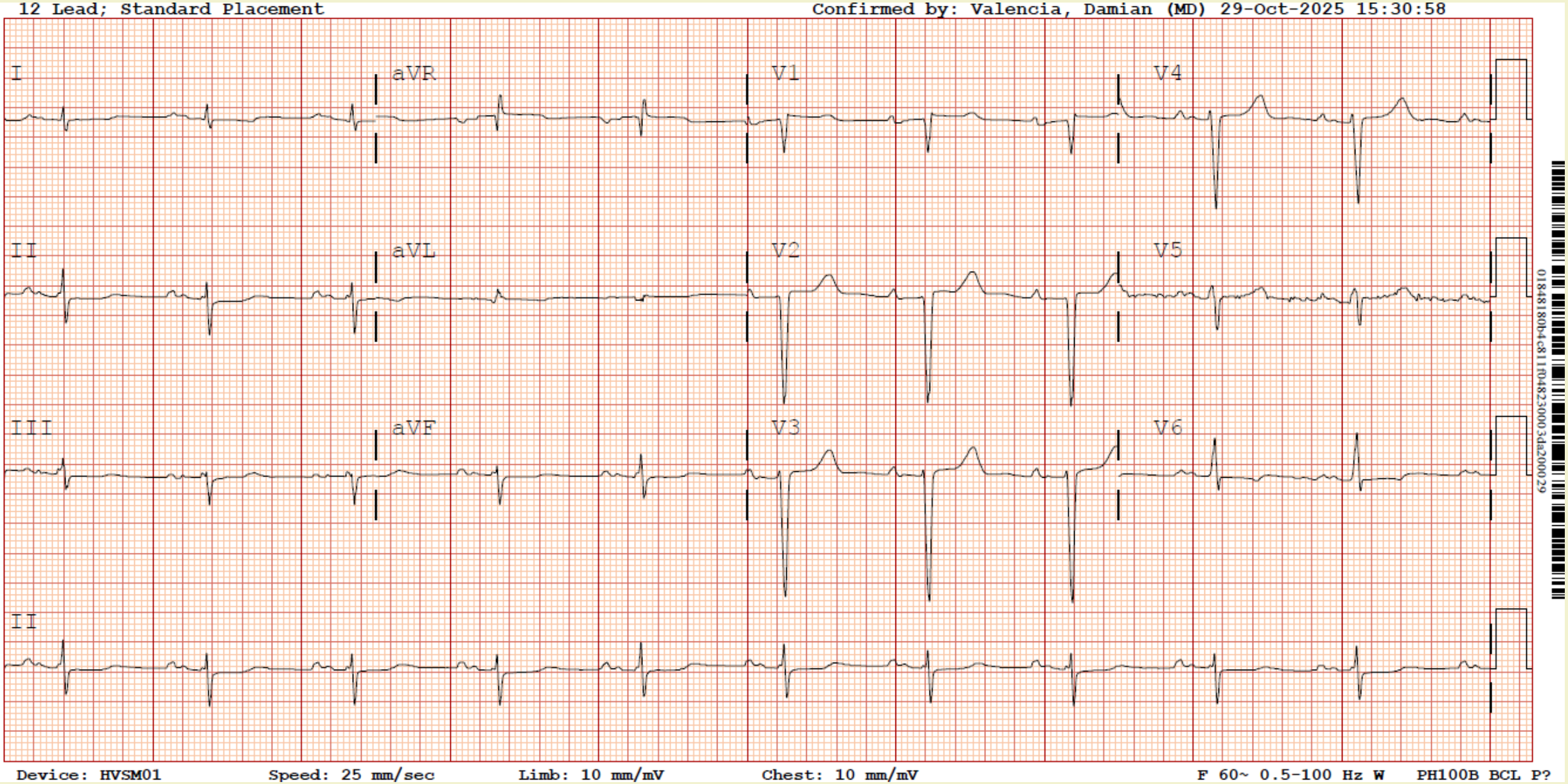
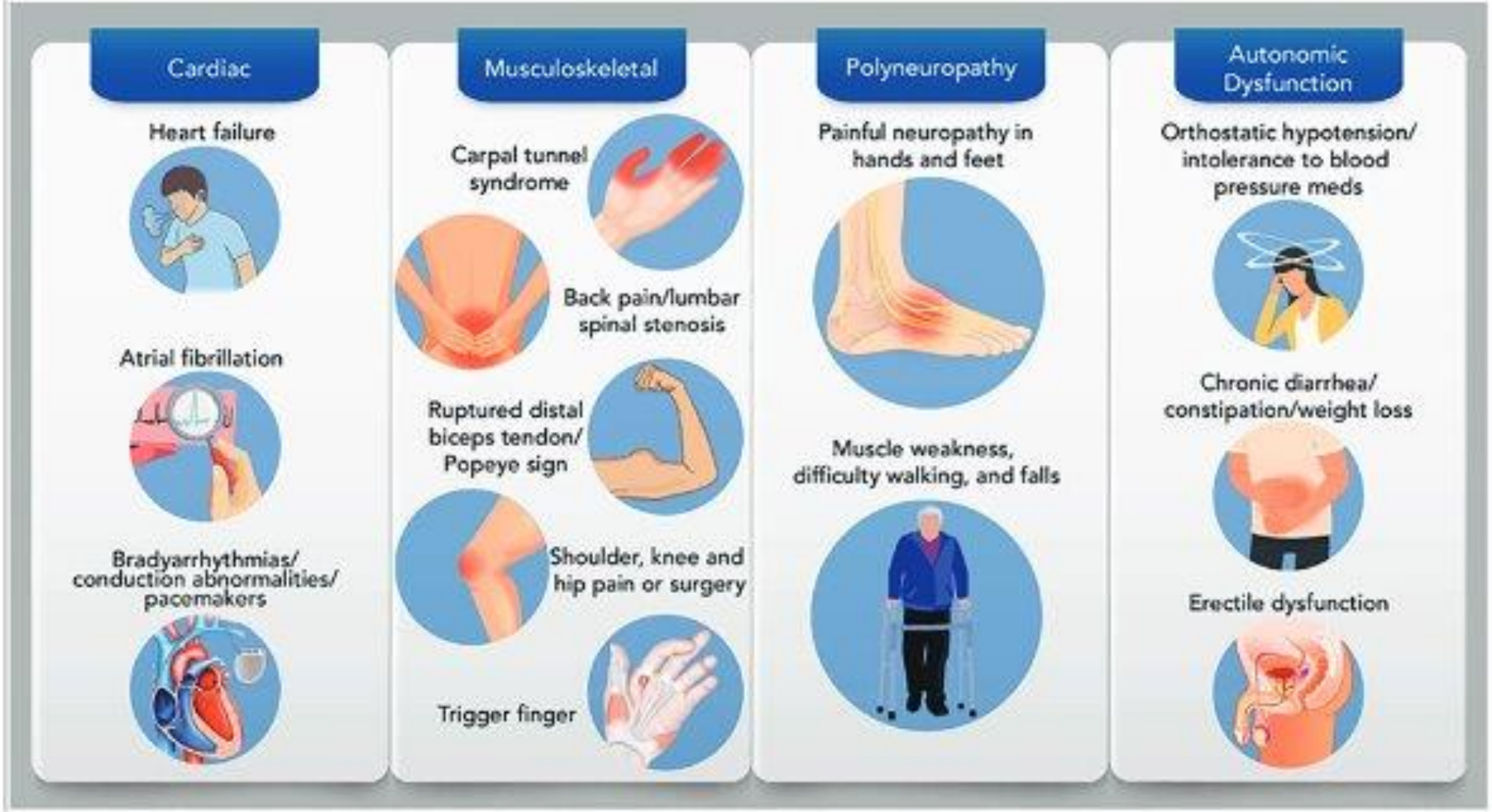

12 Lead; Standard Placement
Confirmed by: Valencia, Damian (MD) 29-Oct-2025 15:30:58
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Device: HVSM01
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10 mm/mV
F 60~ 0.5-100 Hz W
PH100B BCL P?

FIGURE 2 **Clinical Manifestations of Cardiac Amyloidosis***

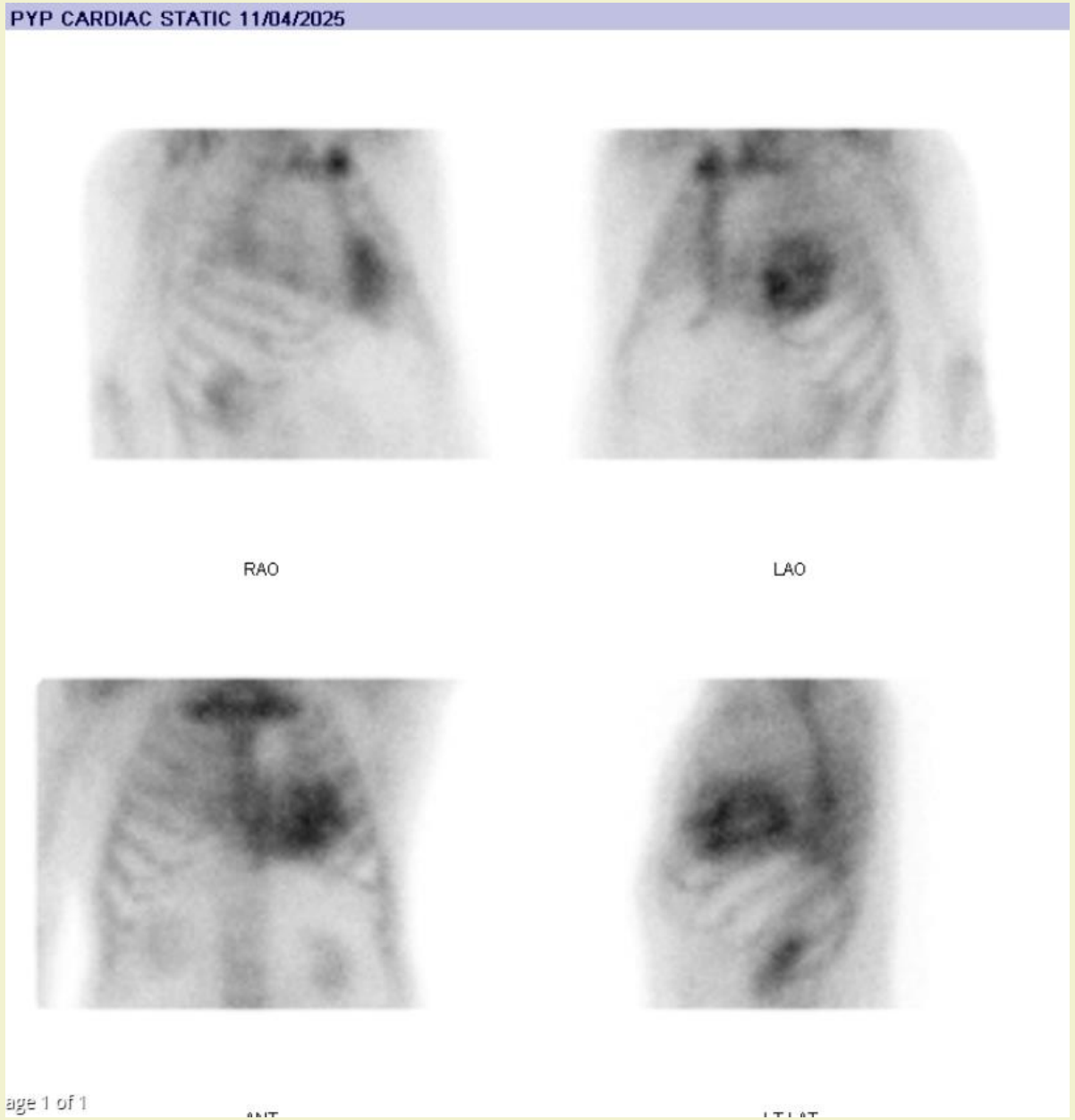


- For AL or First-degree Amyloid (Light chain deposits)

- What to order?
  - IFE and Protein Electrophoresis, Random Urine
  - Immunofixation (IFE), Serum and Protein Electrophoresis, Serum
  - Light chains, free

- For Familial/Senile Amyloid
  - ATTR

  - PYP scan


PYP CARDIAC STATIC 11/04/2025
RAO
LAO
age 1 of 1

Case #2

59 YO male who presents with SOB, and Hypotension after starting Bisoprolol. Indicated that she was SOB for couple of days. +PND +Orthopnea +JVD. +Minimal lower extremity edema

PMHx: Cardiomyopathy with EF = 20-25%, Dilated. Diagnosed 1 month ago
- HTN, Dyslipidemia

No Prior Cardiac Workup as he wanted care at the VA

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I

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Lack of conventional HFpEF risk factors; exercise-intolerant-only phenotype

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Nonresponsive to diuretic agents or medical therapy; Natriuretic peptides extremely high

Resistance to diuretic agents or medical therapy; progressive symptoms; NT-proBNP >3,000 pg/mL, BNP >1,000 pg/mL

H

Hospitalized frequently for HF

2 or more HF hospitalizations in the past year

A

Acute or chronic end-organ dysfunction

Worsening kidney or liver function; cardiac cachexia

L

Low blood pressure

Systolic blood pressure <100 mm Hg

E

Evidence of HFpEF mimics

Management of rare or unusual cardiomyopathies

What did we do next?

- RHC:

Right Cardiac Catheterization:
RA pressure: 17 mmHg
RV pressure: 49/10 mmHg
PA pressure: 49/24 (35) mmHg
PCWP: 26 mmHg

TPG: 9 mmHg
SVR: 2356 dynes-sec-cm-5
PVR: 4 wood units

Fick Method
Cardiac output: 2.3 L/min
Cardiac Index: 1.3 L/min/m2

Thermodilution Method
Cardiac output: 2.1 L/min
Cardiac Index: 1.2 L/min/m2

- Called Our Local Advanced CHF specialist

- Patient was started on Dobutamine
  - IV diuresis with improvement of fluid status
  - Was able to start on low dose Captopril.
  - Further work up with Adv CHF clinic.

SGLT2

- DELIVER (Dapagliflozin Evaluation to Improve the LIVEs of Patients with PReserved Ejection Fraction Heart Failure
- EMPEROR Trial
  - Decreased hospitalization
  - Improvement of symptoms
  - Decrease in CV deaths

- MRNA
  - TOPCAT - "Treatment of Preserved Cadiac Function Heart Failure with Aldosterone Antagonist"
    - No significant change in CV death or overall hospitilazation
    - May decrease "individual component of hospitalization for HF"
    - No improvement of QOL or improved exercise
    - May help with a) diuresis b) HTN c) reduce HF hospitlization

THE END!