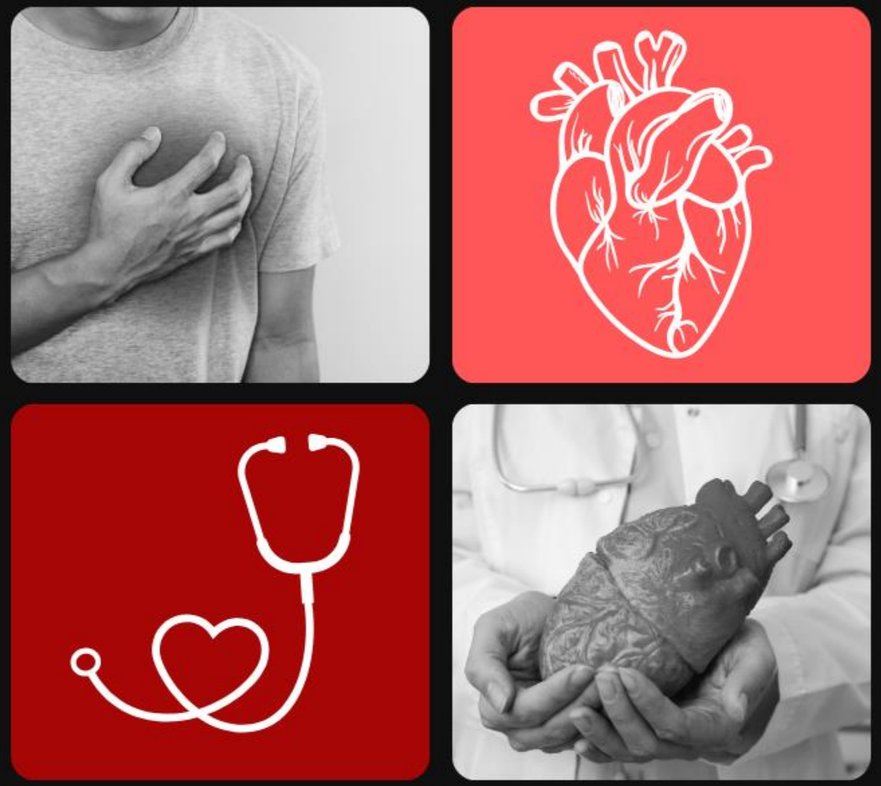


Heart Failure Guidelines

Update and Cases

Presented By:

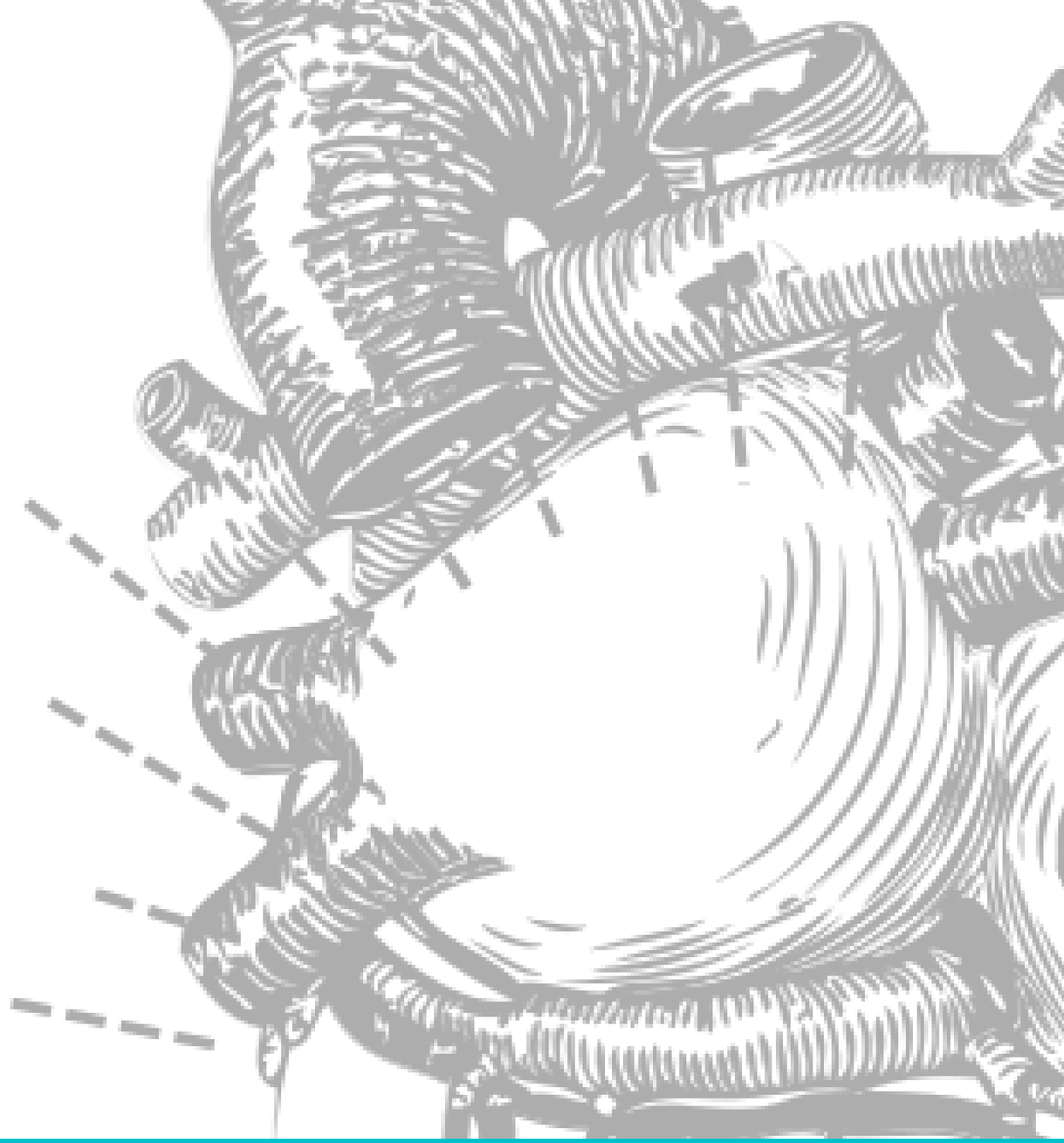
Jennifer Carlquist

PA-C, ER-CAQ

WHAT WE'LL DISCUSS TODAY

CHF Menu

- The new **definition** of HF
- The New **Pillars**
- Focusing on the **causes**
- Focusing on **prevention**
- **Guidelines** Review
- Case Studies



WHAT ARE THE SYMPTOMS

Manifestations of Chf

- Dyspnea on exertion
- Fatigue
- Lower extremity edema
- **Tachycardia**
- Wheezing/dry/wet cough
- Weight gain



Epidemiology of Heart Failure

- 6 million people in the US 1.5-2% of the population have HF, incidence increases with age and 25% higher in Blacks (esp at younger age)
- 26% of hospital admissions among >65 yo are due to HF
- HF is responsible for >11 million visits to a physician's office and result in 1.2 million hospitalizations per year (2017)
- Prognosis/survival of heart failure patients has been quofed to be -50-60% in 5 years, worse in those with hospitalization

Etiology of Heart Failure

- Coronary artery disease: 70-75%
- Non-ischemic cardiomyopathies: 20%
- Diabetes mellitus
- HTN-4%
- Valvular diseases: 12% (aortic stenosis most common)
- Toxic injury (tobacco, alcohol, illicit drugs, viral infection, chemo, etc.): 2-4%
- Obesity Rhythm related (AF, RV pacing)
- Infiltrative disease (amyloid)
- Congenital Heart Disease
- Pregnancy Endocrine pathologies (thyroid disease)

RISK FACTORS

Coronary artery disease
Sleep Apnea
HTN
AFIB/PVC’s
Kidney disease
BMI higher than 30
Smoking/Drugs/ETOH
Medications such as cancer drugs (chemotherapy)
COVID
Cardiomyopathy

HEART FAILURE

More reasons **WHY**



1. Post Partum
2. Takatsubo
3. Ischemia
4. Amyloidosis

Right Sided vs Left Sided HF

- **Right sided HF**
  - Leg swelling, abdominal distension, poor appetite, SOB
  - Elevated LFT's and reduced GFR due to congestion
  - Elevated central venous or right atrial pressure
  - Usually caused by left sided disease

- **Left sided HF**
  - Elevated left atrial pressure, low cardiac output
  - Pulmonary edema, SOB, weakness, confusion
  - Elevated LFT's and reduced GFR from poor perfusion

(Biventricular HF is common)

Physical Exam Findings can in

Look at the vitals for:

- Low BP, narrow pulse pressure, **tachycardia**

- Rales/crackles
- Swelling

- - Legs, sacrum, abdominal wall, scrotum, **JVP**

- S3 (“Kentucky”, LV dysfunction, overloaded LV)
- Murmurs

- Peripheral perfusion may be compromised so always **feel the legs** and then put your thumb on them



Right Sided vs Left Sided HF

- **Right sided HF**
  - Leg swelling, abdominal distension, poor appetite, SOB
  - Elevated LFT's and reduced GFR due to congestion
  - Elevated central venous or right atrial pressure
  - Usually caused by left sided disease

- **Left sided HF**
  - Elevated left atrial pressure, low cardiac output
  - Pulmonary edema, SOB, weakness, confusion
  - Elevated LFT's and reduced GFR from poor perfusion



(Biventricular HF is common)

Universal Definition and Classification of Heart Failure (HF)

Definition

HF is a *clinical syndrome* with current or prior

- ***Symptoms and or signs caused by a structural and/or functional cardiac***

And corroborated by at least one of the following:

- ***Elevated natriuretic peptide levels***
- ***Objective evidence of cardiogenic pulmonary or systemic congestion***

Stages

AT RISK *(STAGE A)*	**Patients at risk for HF, but without current or prior symptoms or signs of HF and without structural cardiac changes or elevated biomarkers of heart disease**
PRE-HF *(STAGE B)*	**Patients without current or prior symptoms or signs of HF with evidence of <u>one</u> of the following:** • *Structural Heart Disease* • *Abnormal cardiac function* • *Elevated natriuretic peptide or cardiac troponin levels*
HF *(STAGE C)*	**Patients with current or prior symptoms and/or signs of HF caused by a structural and/or functional cardiac abnormality**
ADVANCED HF *(STAGE D)*	**Severe symptoms and/or signs of HF at rest, recurrent hospitalizations despite GDMT, refractory or intolerant to GDMT, requiring advanced therapies transplantation, mechanical circulatory support, or palliative care**

Classification By EF

HF with reduced EF (HFrEF)
- *HF with **LVEF < 40%***

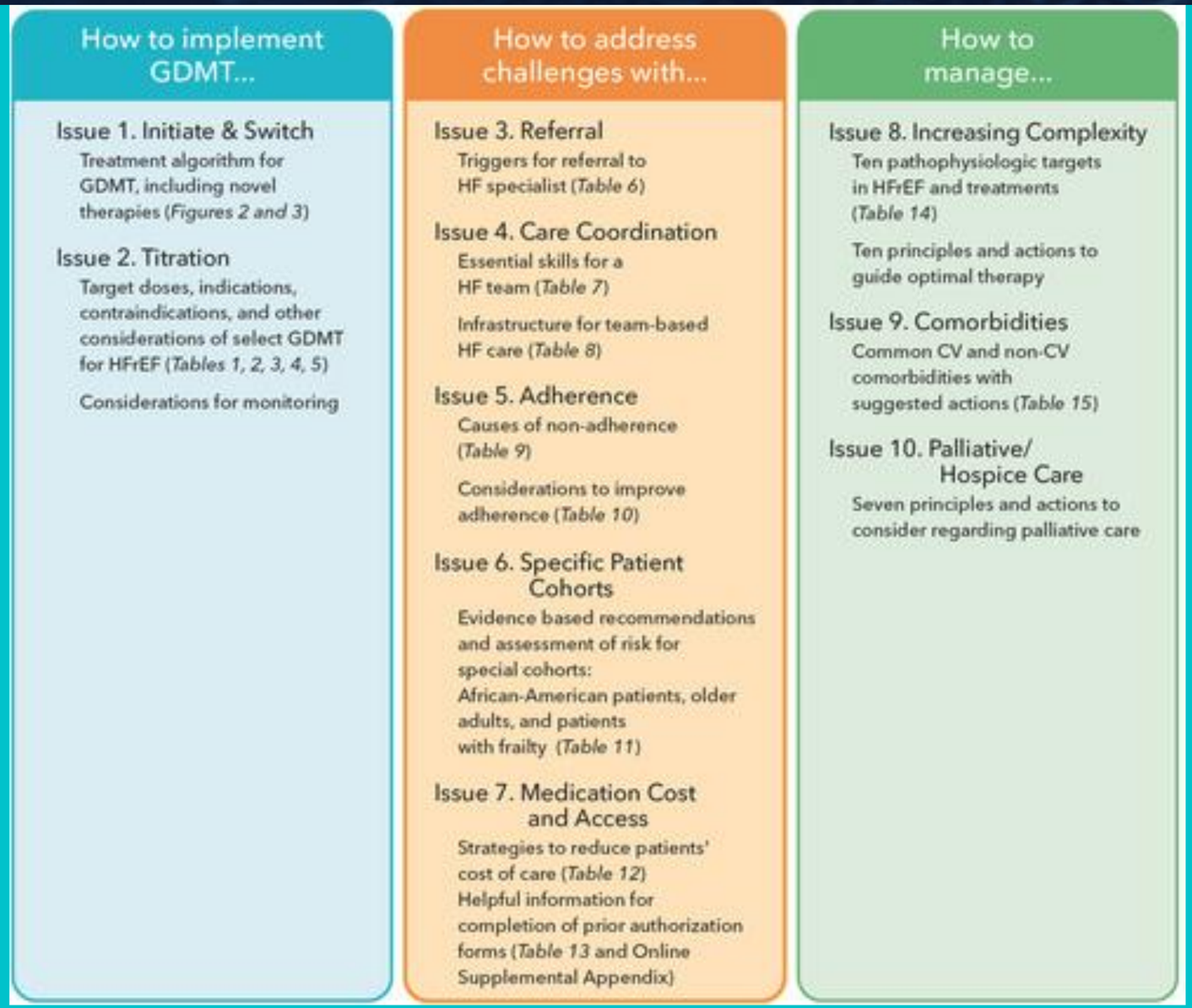
HF with mildly reduced EF (HFmrEF)
- *HF with **LVEF 41-49%***

HF with preserved EF (HFpEF)
- *HF with **LVEF > 50%***

HF with improved EF (HFimpEF)
- *HF with a baseline LVEF of < 40%, a 10-point increase from baseline LVEF, and a second measurement of LVEF of > 40%*

Language matters! The new universal definition offers opportunities for *more precise communication* and description with terms including ***persistent HF*** instead of "stable HF," and ***HF in remission*** rather than "recovered HF."

Ten Pivotal Issues About HFrEF



HEART FAILURE CLASSIFICATIONS

NEW YORK HEART ASSOCIATION

1. Cardiac disease, but no symptoms and no limitation in ordinary physical activity.
2. Mild symptoms and slight limitation during ordinary activity.
3. Significant limitation in activity due to symptoms. Comfortable only at rest.
4. Severe limitations. Symptoms even while at rest.

WHAT'S NEW?

- **Heart failure Stages**
- **ACC/AHA Classification**

Stage A: At risk for heart failure	People who are at risk for heart failure but do not yet have symptoms or structural or functional heart disease.
Stage B: Pre-heart failure	People without current or previous symptoms of heart failure but with either structural heart disease, increased filling pressures in the heart or other risk factors
Stage C: Symptomatic heart failure	People with current or previous symptoms of heart failure
Stage D: Advanced heart failure	People with heart failure symptoms that interfere with daily life functions or lead to repeated hospitalizations

CLASSIFICATION OF HF

Classification of HF according to LVEF now includes:

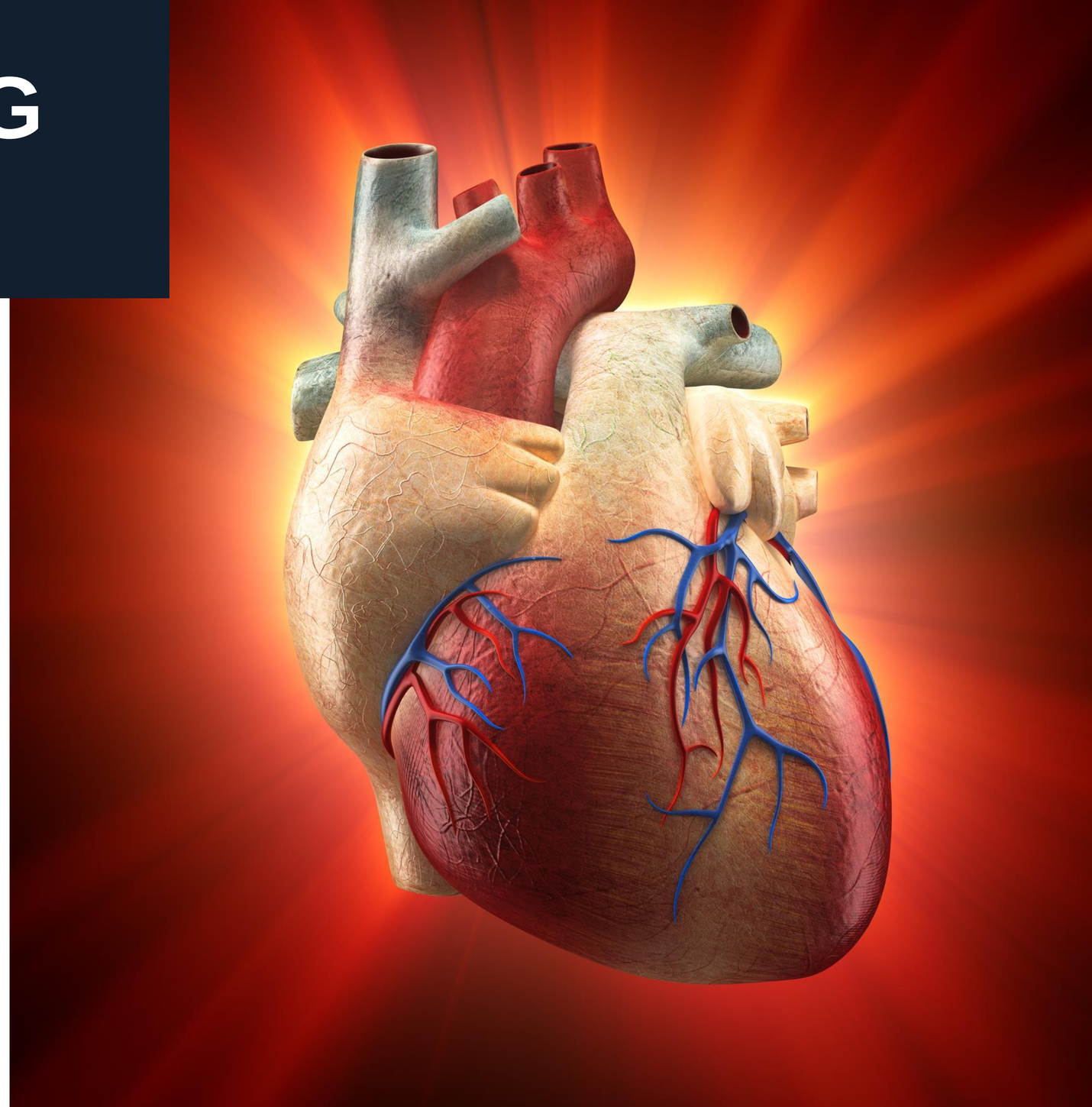
- **HFrEF**: symptomatic HF with LVEF ≤40%
- **HFmrEF**: symptomatic HF with LVEF 41-49%
- **HFpEF:** symptomatic HF with LVEF ≥50%
- **HFimpEF:** symptomatic HF with a baseline LVEF ≤40%, a ≥10-point increase from baseline LVEF, and a second measurement of LVEF >40%

Causes for Decompensated HF

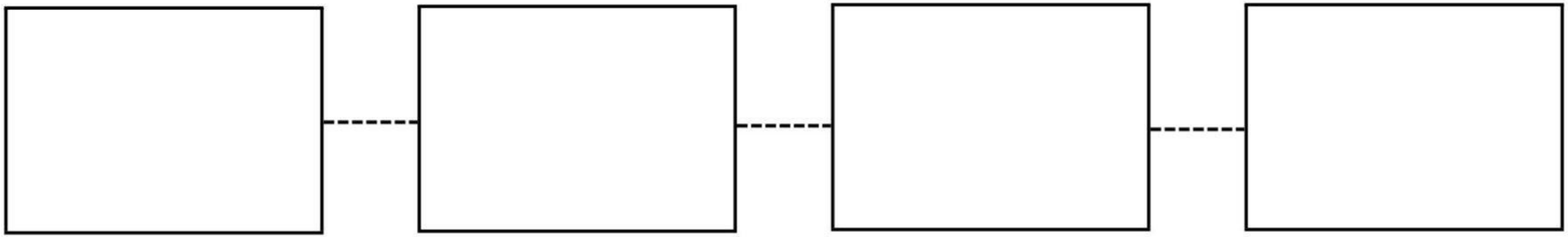
- Compliance or drug interaction
- Inadequate outpatient diuresis
- Progressive negative remodeling
- Acute coronary syndrome
- Poorly controlled HTN Arrhythmia
- Valve disease Pericardial disease
- Increased metabolic demand (anemia, sepsis, thyroid)
- Renal failure
- Continued toxin exposure (ETOH, cocaine)

FOCUS ON ADDING THERAPIES

- 4 Pillars
- Vericiguat
- Ivabradine
- Hydralazine/nitrate



4 Pillars of Heart Failure



Diuretics: _____

Cardiac Rehab: _____

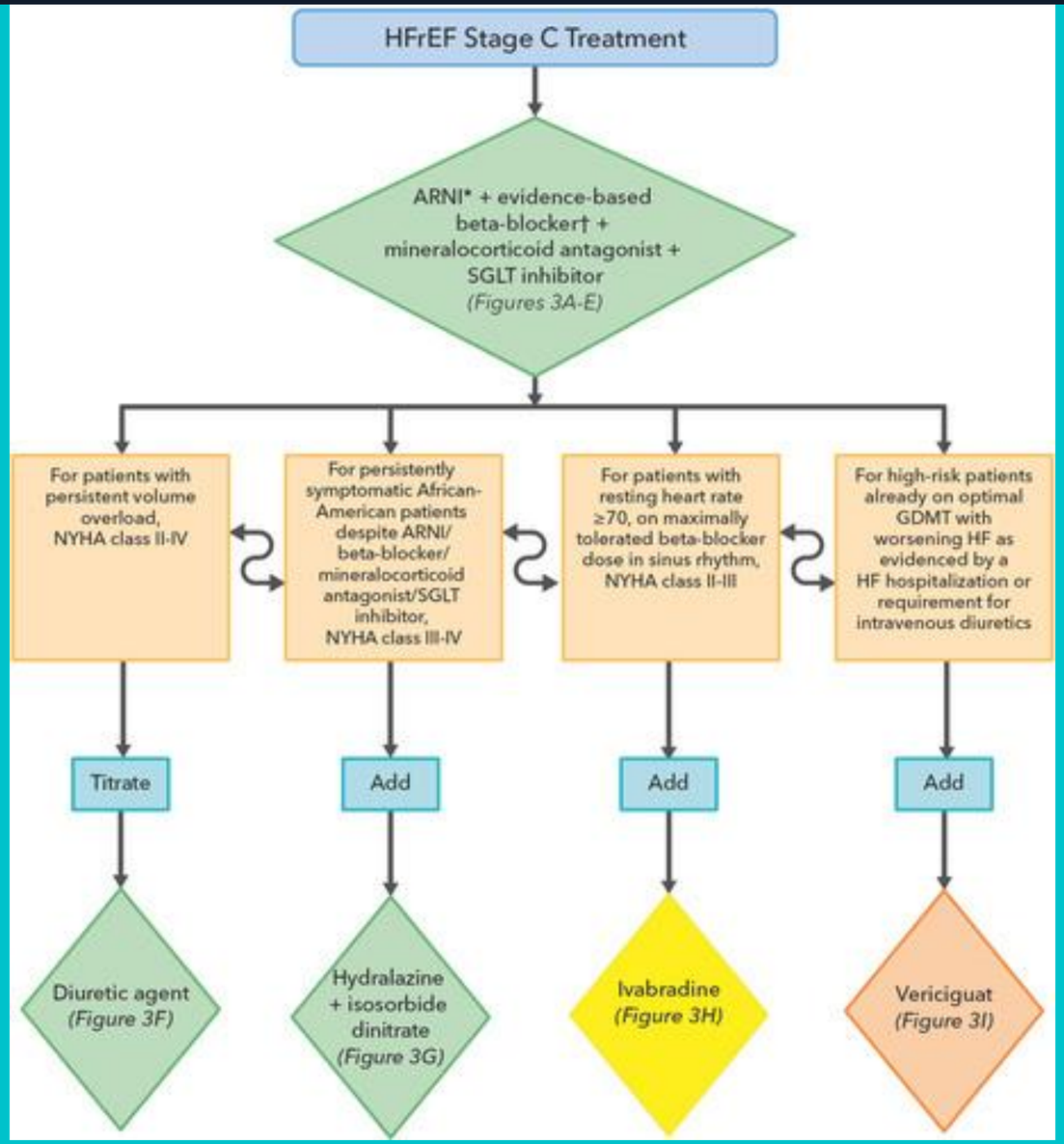
Cause of HF: _____

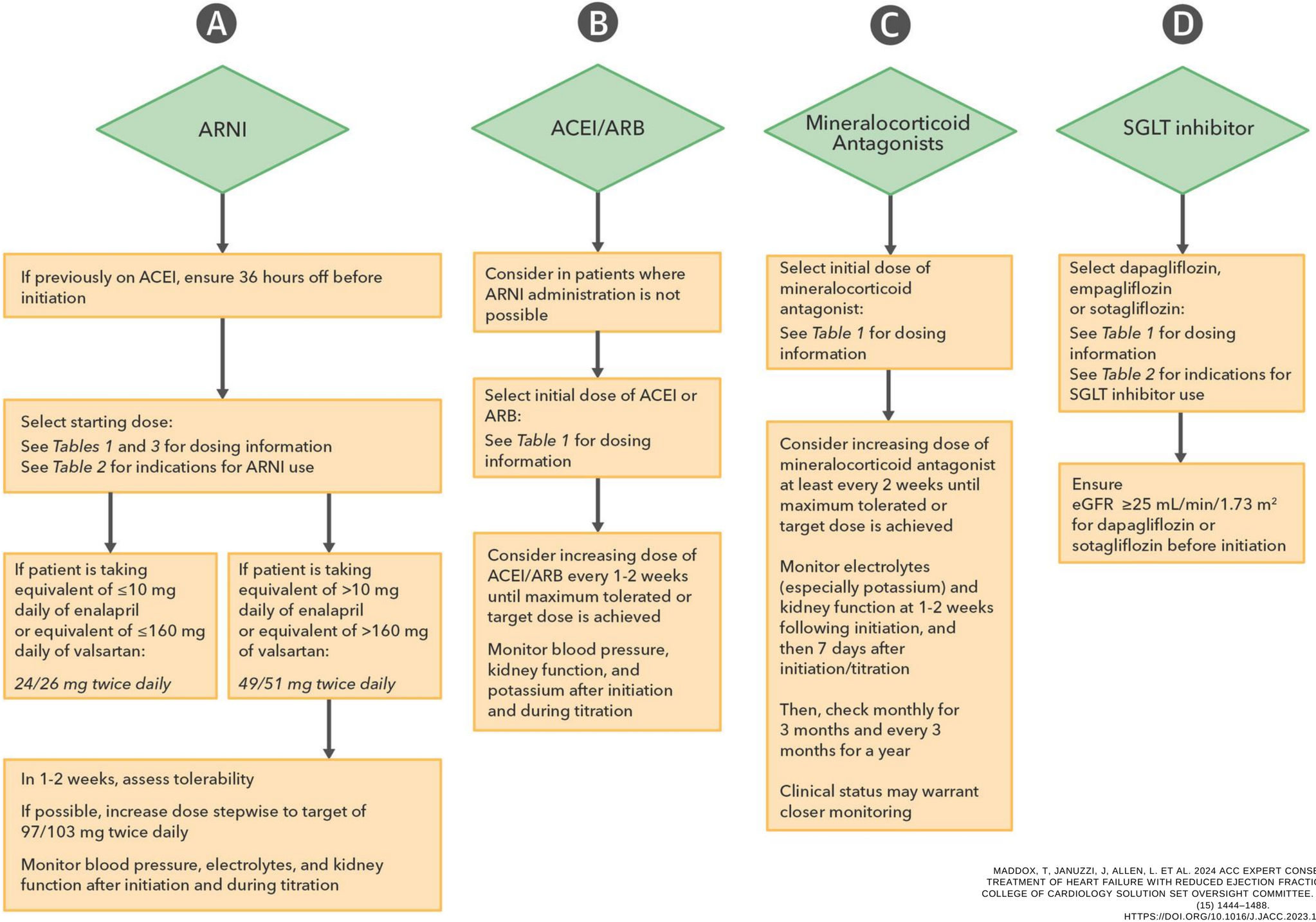
"FANTASTIC 4"




SGLT2I
ARNI
Sacubitril/
Valsartan
MRA
BB
Carvedilol
Metoprolol
Succ
Empaglifozin
Eplerenone
Spironolactone
Dapaglifozin

HFREF STAGE C TREATMENT





MADDOX, T, JANUZZI, J, ALLEN, L. ET AL. 2024 ACC EXPERT CONSENSUS DECISION PATHWAY FOR TREATMENT OF HEART FAILURE WITH REDUCED EJECTION FRACTION: A REPORT OF THE AMERICAN COLLEGE OF CARDIOLOGY SOLUTION SET OVERSIGHT COMMITTEE. J AM COLL CARDIOL. 2024 APR, 83 (15) 1444–1488.
HTTPS://DOI.ORG/10.1016/J.JACC.2023.12.024

GUIDELINES UPDATE

2024 ACC Expert Consensus Decision Pathway for Treatment of Heart Failure With Reduced Ejection Fraction

STRONG-HF TRIAL SHOWED SAFETY AND EFFICACY OF A GOAL OF 50% OF TARGET DOSES BY HOSPITAL DISCHARGE AND 100% OF TARGET DOSES BY 2 WEEKS

4 KEY MEDICATION CLASSES AS SOON AS POSSIBLE, AND IDEALLY NO LONGER THAN 3 MONTHS

CHOOSE ARNI WHEN STILL WET, ADD BB WHEN MORE DRY

50% OF SUBJECTS WITHDRAWN FROM GDMT HAD A RELAPSE OF THEIR CARDIOMYOPATHY WITHIN 6 MONTHS

https://www.jacc.org/doi/10.1016/j.jacc.2023.12.024

Indications for Use of an SGLT2 Inhibitor in HFrEF

- HFrEF (EF ≤40%) with or without diabetes
- NYHA functional class II-IV HF
- Administered in conjunction with a background of GDMT for HF

Caution:

eGFR <25 mL

IDDM

If frequent UTI's or mycotic infections

INDICATIONS FOR USE OF IVABRADINE IN HFREF

- LVEF ≤35%
- On maximum tolerated dose of beta-blocker
- ***Sinus rhythm*** with a resting heart rate ≥70 beats/min
- NYHA functional class II or III HF

Cautions:

Sinus node disease

Cardiac conduction defects

Prolonged QT interval

Resting heart rate <60 beats/min

VERQUVO INDICATIONS



LVef < 45%
NYHA II, III
Chronic HF
One hospitalization in their lifetime for HF
On standard of care -- (ARNI/BB/Sglt2I/MRA)
Can go down to GFR of 15%
It is BP neutral (1-2 mm)
Dose increase q 2 weeks to max dose where benefits are seen
SE: Anemia, minor hepatic clearance

ENTRESTO (SACUBITRIL/VALSARTAN)



Used in NYHA Class II-IV HF

(20% reduction in mortality v ACEI)

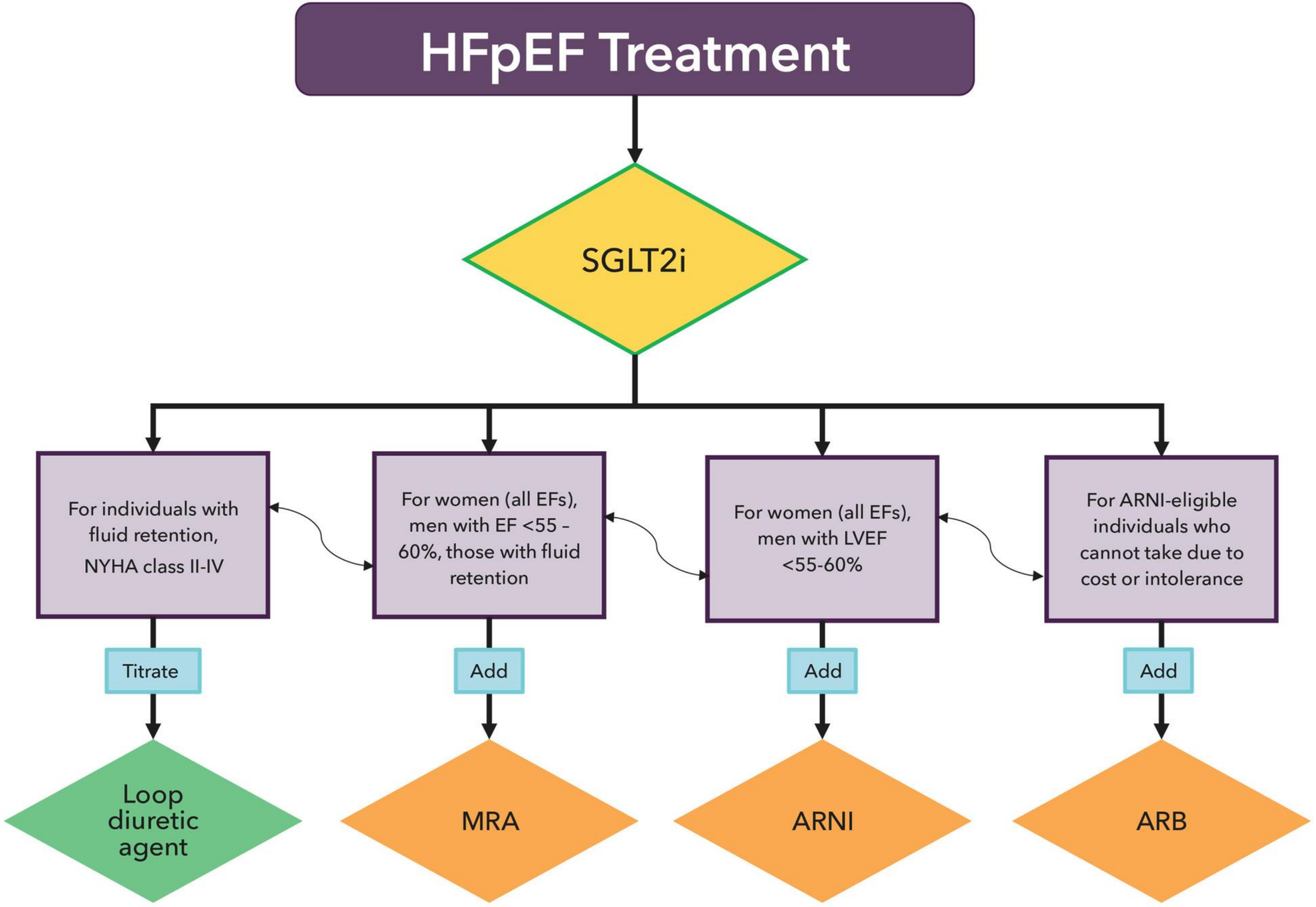
Half diuretic dose may help

STOP ARB or ACEI

36 hour washout pre start

Double after 2-4 weeks

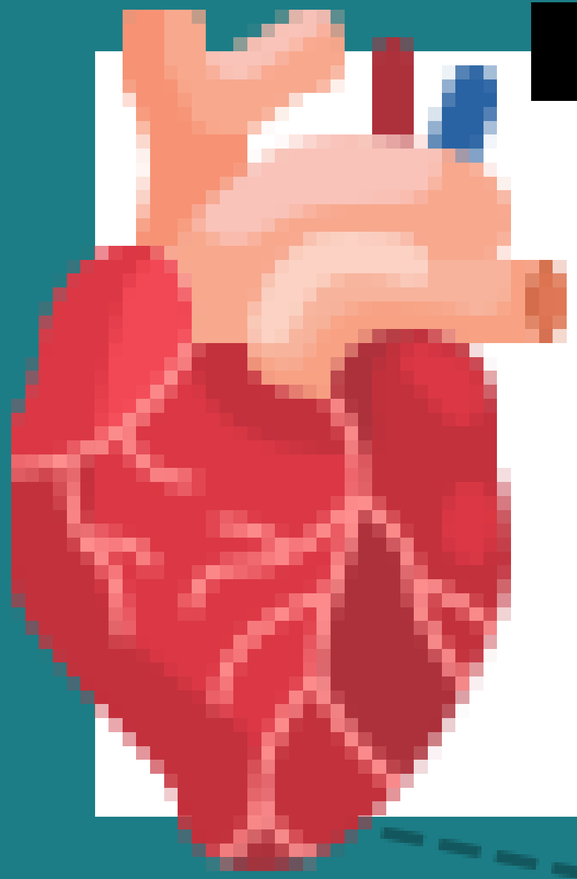
.


HFpEF Treatment
SGLT2i
For individuals with fluid retention, NYHA class II-IV
For women (all EFs), men with EF <55 – 60%, those with fluid retention
For women (all EFs), men with LVEF <55-60%
For ARNI-eligible individuals who cannot take due to cost or intolerance
Titrate
Add
Add
Add
Loop diuretic agent
MRA
ARNI
ARB

SGLT2I

Reduces CV death
18% reduction

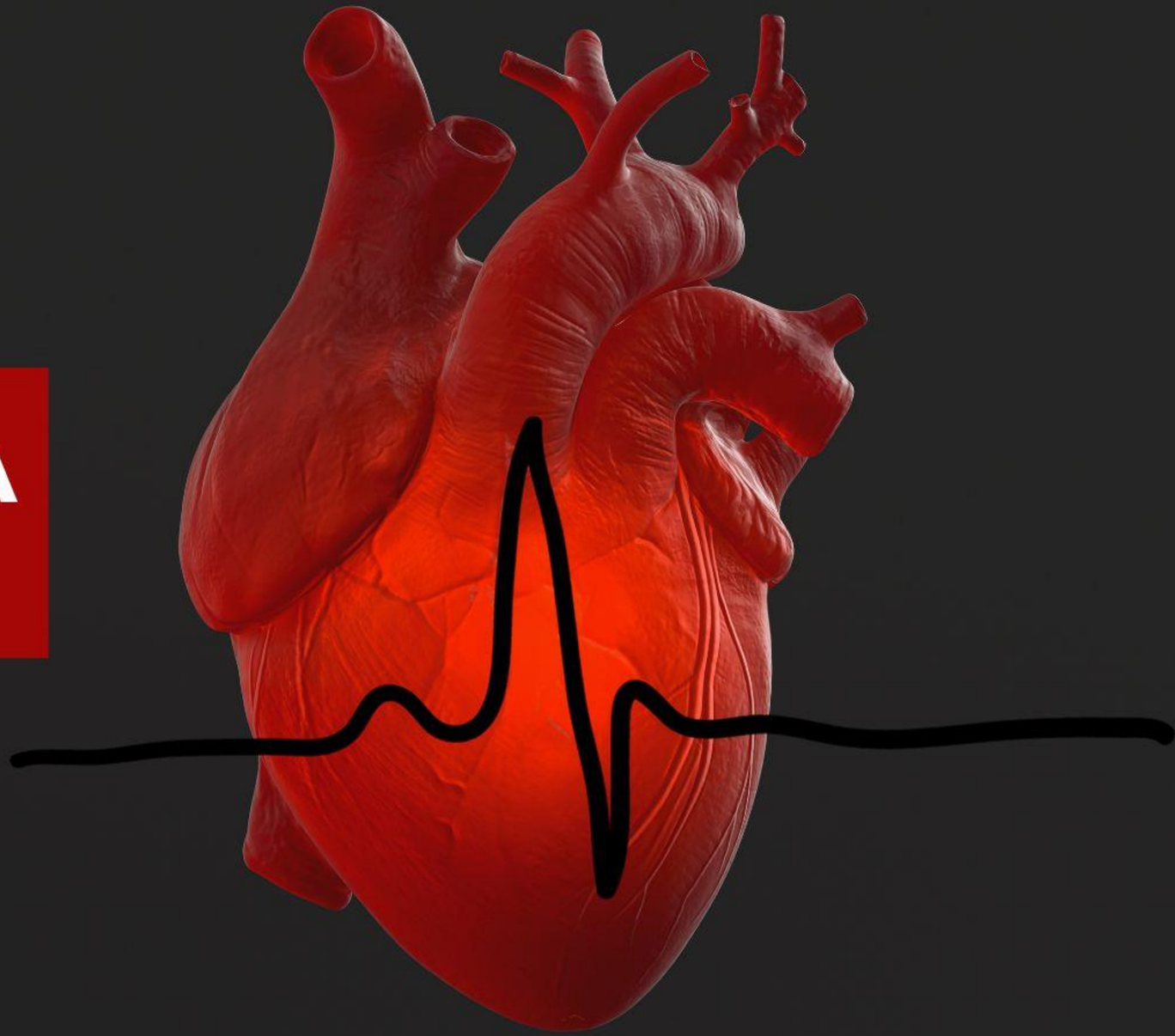
13-28 days to start seeing benefit
Can go to 25 GFR



HEART FAILURE CASES

LET'S DO A

Case!





The Case

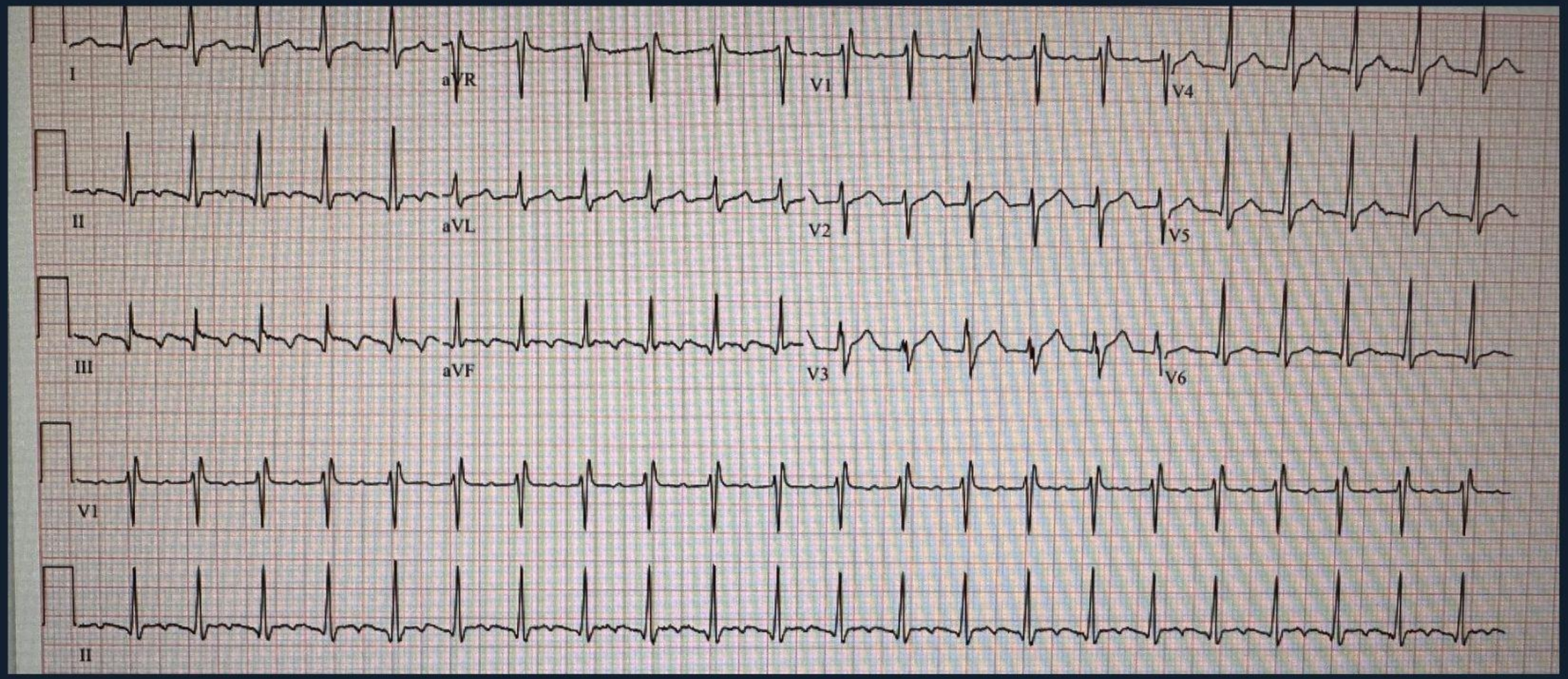


41-year-old male

Palpitations

- Reports frequent urination, palpitations, fatigue and chest pain
- Hx: OSA, DM, HTN, HLD

EKG





ECHO

Summary:

- No prior echocardiogram for comparison Normal left ventricular chamber size.
- There is mild concentric left ventricular hypertrophy
- The presence of arrhythmia precludes accurate assessment of diastolic
- function
- Regional wall motion is normal.
- Ejection fraction measured by Simpson's biplane is 50%, low normal. The left atrial indexed volume is normal.
- No significant valvular abnormalities.



STRESS TEST

Findings:

- Mostly a normal myocardial perfusion study with a tissue attenuating fact, Small, mild, fixed perfusion defect in the mid segment of the teroseptal wall.
- No ischemia noted
- Left ventricle is normal without stress-induced dilation
- Global hypokinesis.
- **EF 36%**
- **EF 37 %**
- SRS 2 SDS 0

Impression:

- Mostly a normal myocardial perfusion study with a tissue attenuating artifact. Small, mild, fixed perfusion defect in the mid segment of the anteroseptal wall. No ischemia noted.
- Global hypokinesis. Normal LV size without transient ischemic dilation. Depressed rest EF and depressed post-stress EF without evidence of stunning.
- Scan significance: suggestive of a low risk for hard cardiac events.

What should we do next?

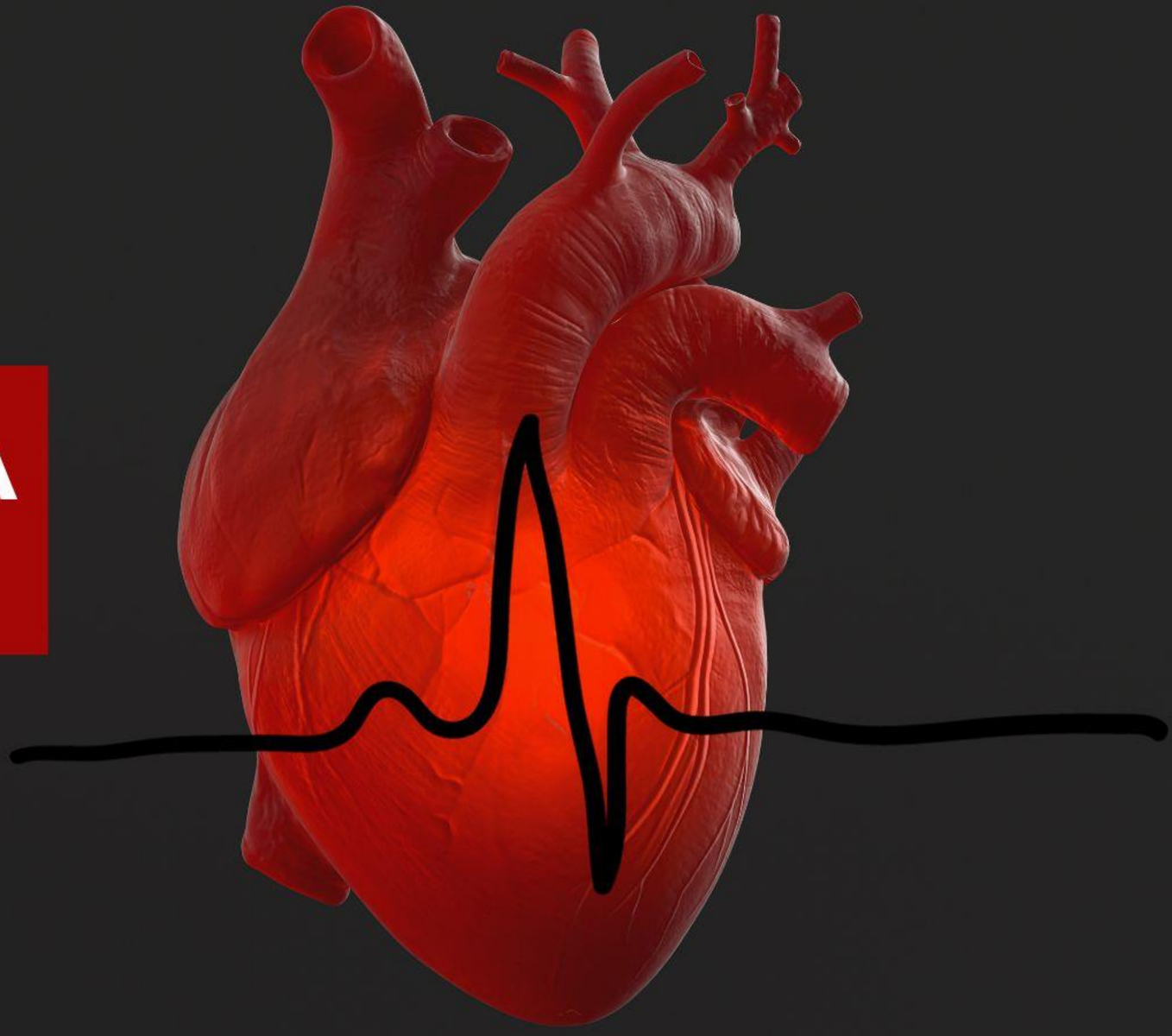


Why is he in heart failure?

What medications does he need?

LET'S DO A

Case!





The Case

Not a real patients face



25-year-old female

Complaints:

- Shortness of breath for 2 days, cough for 4 months

Social History

- Non-smoker

Past Medical History

- Asthma

VITAL SIGNS & PHYSICAL FINDINGS

- **Blood Pressure:** 154/89
- **Heart Rate:** 97 bpm
- **O2 Saturation:** 99%
- **BMI:** 49 (morbid obesity)



LABS



- **Potassium:** 4.2 mmol/L
- **Creatinine:** 0.70 mg/dL
- **CRP:** 0.3 mg/dL
- **Hemoglobin:** 11.0 g/dL
- **High-Sensitivity Troponin:** 10 → 10 ng/L
- **TSH:** 0.83 mIU/L
- **D-Dimer:** 885 ng/mL

IMAGING RESULTS

Chest X-ray

Findings:

- Interstitial edema (suggestive of pulmonary edema)
- Cardiomegaly

Chest CT

Findings:

- No pulmonary embolism (PE)
- Ground-glass opacities

CARDIOVASCULAR ASSESSMENT

Echocardiogram

- *Ejection Fraction (EF): 31-35%*
- *Structural Findings:*
  - *Mild left ventricular hypertrophy (LVH)*
  - *Grade II diastolic dysfunction (DD)*

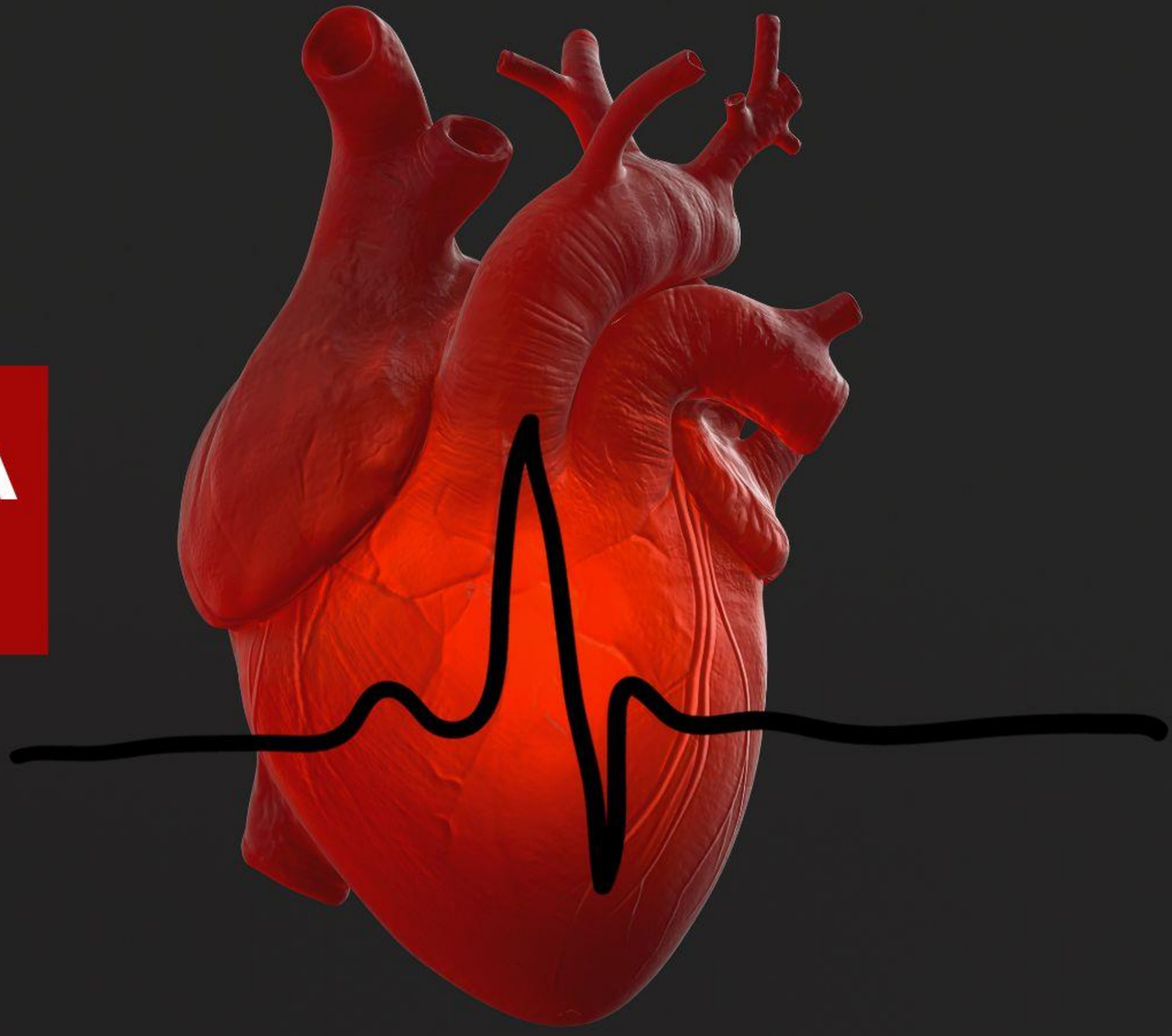
Coronary Angiogram

Findings:

- No occlusive disease (0% stenosis in all arteries)

LET'S DO A

Case!





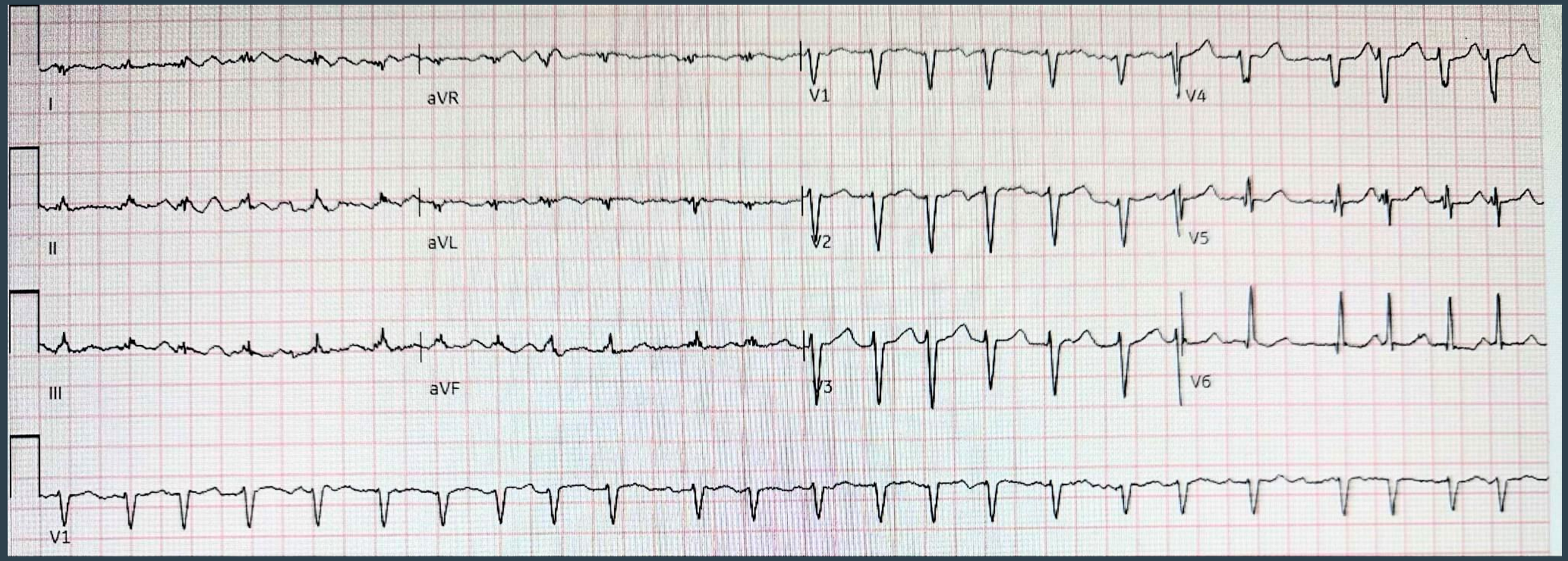
The Case

72-year-old Male

Chief Complaint:

- Dyspnea on exertion (DOE) and dyspnea for 1 month
- New-onset lower leg swelling for 1 week

THE EKG



LABS

- Electrolytes: Na: 133 K: 4.1, Cr: 0.97
- Liver Enzymes:
- ALT: 137, AST: 217
- Alk Phos: 214
- ProBNP: 9,994
- Ddimer 1,948
- Lipid Panel: TC 155, Tri 78, LDL 34
- Total Cholesterol: 155, Triglycerides: 81, LDL: 46

WHAT SHOULD WE DO NOW

Furosemide 40 IV bid

Had Metoprolol 5 mg x 2 iv and HR now 102, BP 96/50.

Consider Digoxin

Order ETOH level

IMAGING

CT of abd showed: Diffuse hepatic steatosis, scrotal edema

CT of chest showed: No PE, Small bilateral pleural effusions

ECHO

Echo EF 36-40%

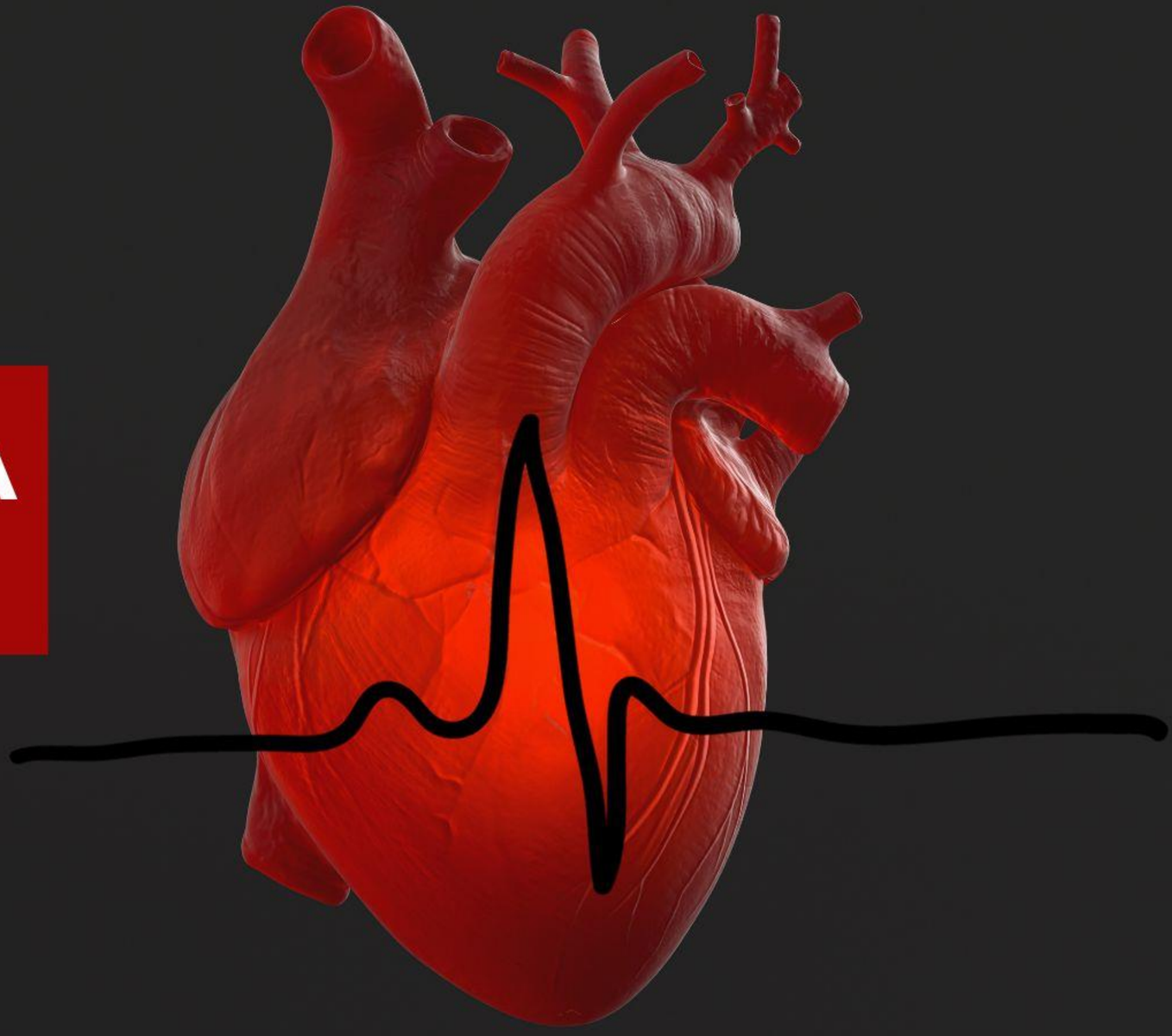
RV Mildly reduced

Grade II DD

No significant valve disease

LET'S DO A

Case!





The Case

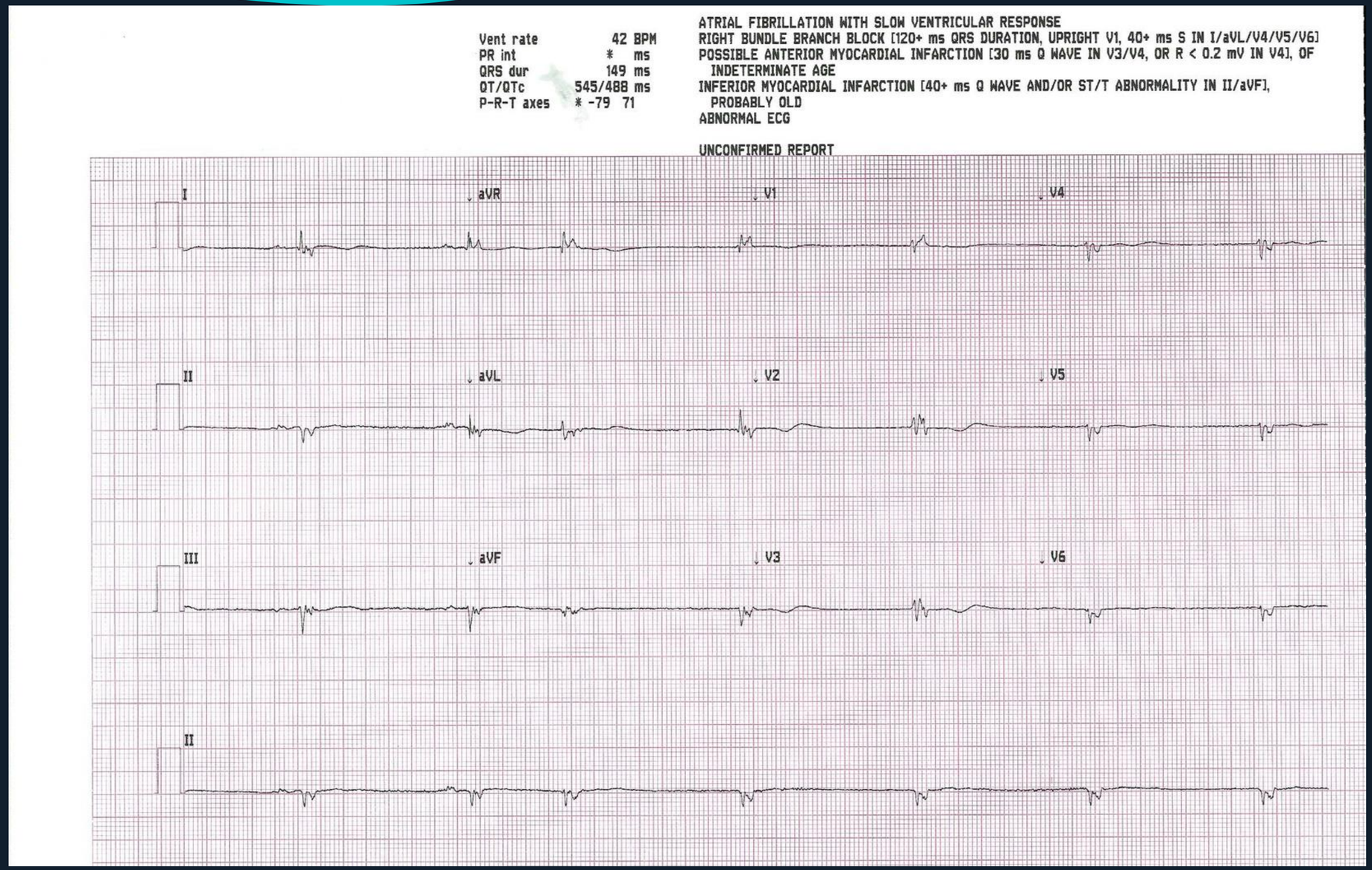
66-year-old male

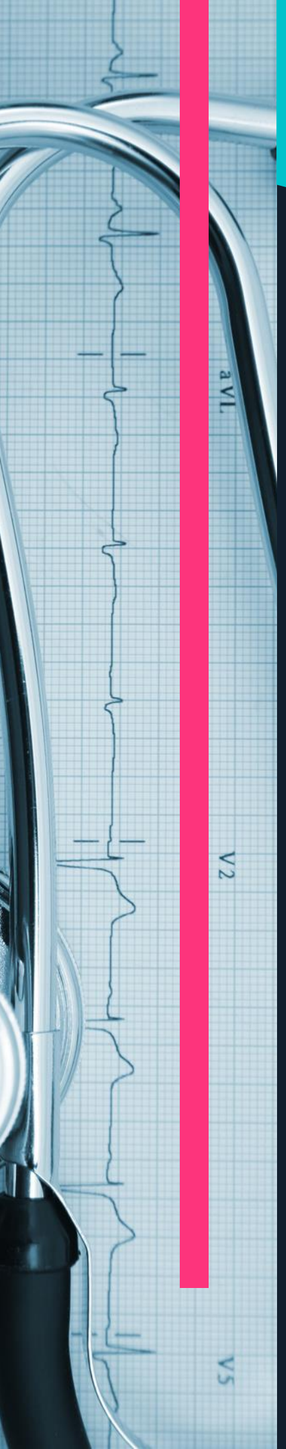
with dyspnea on exertion

Patient History: *sleep apnea, short of breath, diabetes mellitus*



EKG


Vent rate 42 BPM
PR int * ms
QRS dur 149 ms
QT/QTc 545/488 ms
P-R-T axes * -79 71
ATRIAL FIBRILLATION WITH SLOW VENTRICULAR RESPONSE
RIGHT BUNDLE BRANCH BLOCK [120+ ms QRS DURATION, UPRIGHT V1, 40+ ms S IN I/aVL/V4/V5/V6]
POSSIBLE ANTERIOR MYOCARDIAL INFARCTION [30 ms Q WAVE IN V3/V4, OR R < 0.2 mV IN V4], OF INDETERMINATE AGE
INFERIOR MYOCARDIAL INFARCTION [40+ ms Q WAVE AND/OR ST/T ABNORMALITY IN II/aVF], PROBABLY OLD
ABNORMAL ECG
UNCONFIRMED REPORT
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

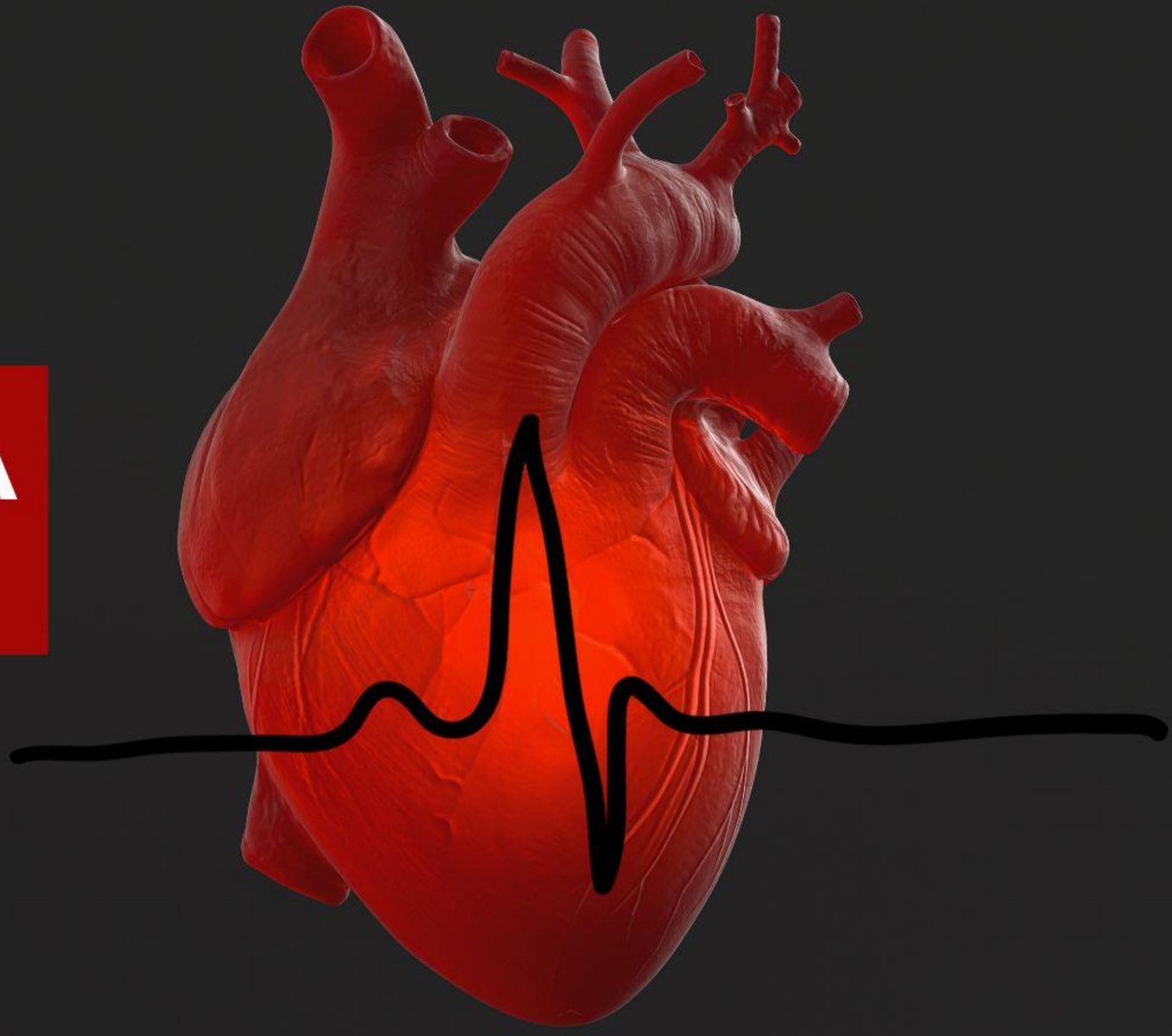


ECHO

1. Severely reduced LV systolic function with global hypokinesis. Moderate LV enlargement. Simpson's EF **23%**.
2. Mild concentric LVH with grade 2 diastolic dysfunction.
3. 4-chamber enlargement with severe bi-atrial enlargement. Moderate RV enlargement with global hypokinesis.
4. Mild mitral regurgitation.
5. Mild tricuspid regurgitation with mild pulmonary hypertension, PASP 35 mmHg
6. No prior studies for comparison.

LET'S DO A

Case!





Not a real patients face

50-year-old male routine follow-up status post cardiac arrest

Vital signs

BP: 112/58

HR: 79

RR: 18

o2 sat 99%

Weight 135 lbs.

The Case





PAST MEDICAL HISTORY:

- Cardiac arrest six months ago & 2 years prior
- ICD implantation
- Mitral valve regurgitation s/p replacement 6 months ago
- Cardiomyopathy
- Last echocardiogram 3months ago ejection fraction 30%



EXAM: NORMAL ✓

Has not seen cardiology since discharge six months ago

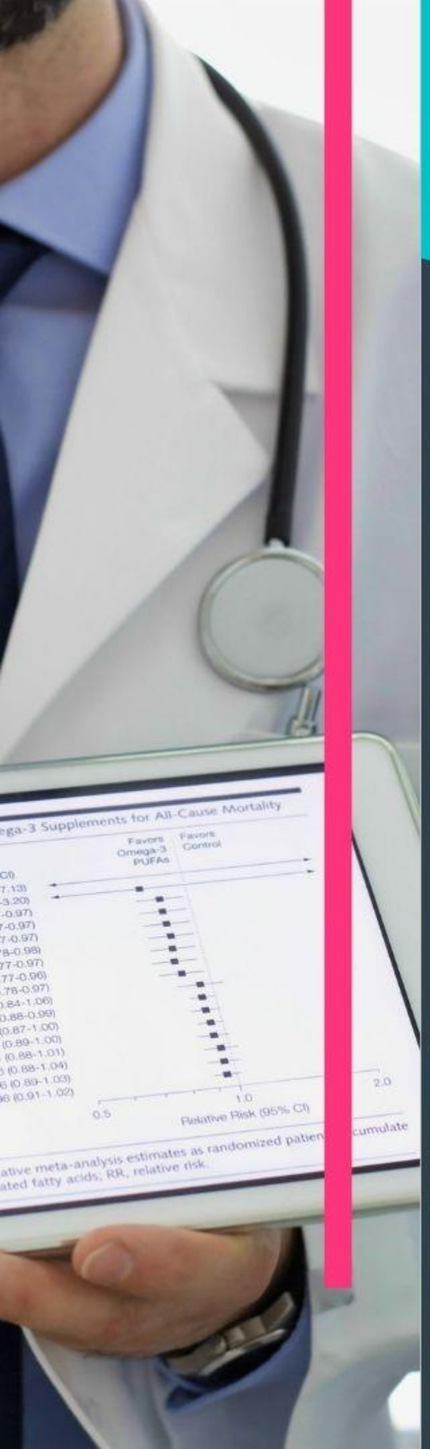
What do you do?

Meds : Zinc

ICD interrogated:

12 episodes of SVT

No Afib



CONCLUSIONS

Echo:

- Normal left ventricular chamber size
- There is mild concentric left ventricular hypertrophy
- Unable to assess diastolic filling due to paced rhythm with underlying atrial fibrillation
- Regional wall motion is abnormal, global hypokinesis
- Ejection fraction measured by Simpson's biplane is 33%, moderate to severely decreased
- Mitral valve leaflets are structurally normal
- History of mitral valve annuloplasty/mitral valve repair
- Mild mitral regurgitation
- No prior echocardiogram for comparison



What should we do about his medications?

Is there any thing else we can use to see how his heart failure is doing?

STAGE A

Stage A (pre-heart failure) high risk to develop

Here is what put us at risk:

- Hypertension
- Diabetes
- Coronary artery disease
- Metabolic syndrome
- ETOH
- HX rheumatic fever
- Drugs



Patient education:

- Stop smoking
- Get moving, DASH DIET
- HLD therapy
- STOP ETOH
- ACEI or ARB



STAGE B

(“Pre-heart failure”)
LV dysfunction but no sx

- Treatments for Stage A
- BB if previous MI and EF is 40% or lower
- Aldosterone antagonist if EF of 35% or less
- Possible surgery or intervention as a treatment for coronary arte occlusion



Stage C

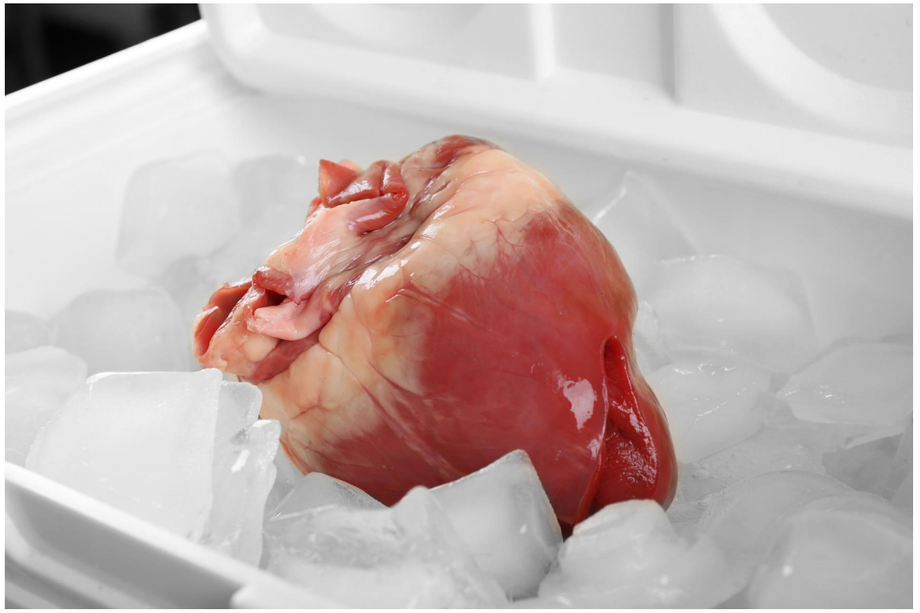
CHF diagnosis and sx now or previously

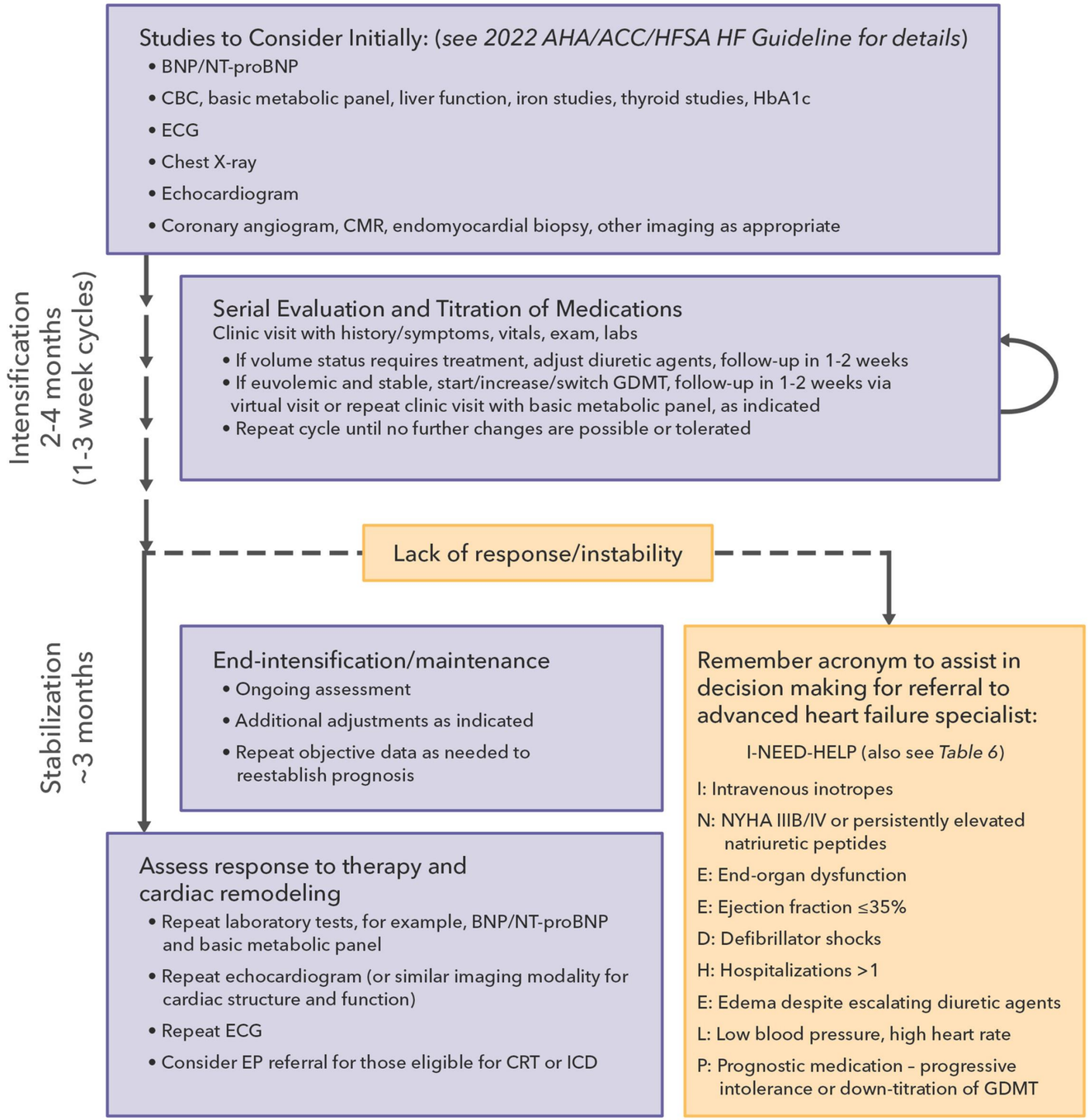
- Beta-blocker
- Aldosterone antagonist
- (SGLT2i)
- Sacubitril/Valsartan
- Hydralazine/nitrate (BiDil) especially for African American patients
- Diuretics prn
- Ivabradine if HR over 70 bpm
- Restriction of sodium (salt) diet
- Weight tracking up 4 lbs
- Fluid restriction
- ICD and maybe CRT if QRS above 120 ms (LBBB)

Stage d

HFrEF with advanced symptoms that don’t get better with treatment.

IV pressors, LVAD, Transplantation considered





I: Intravenous inotropes

N: NYHA IIIB/IV or persistently elevated natriuretic peptides

E: End-organ dysfunction

E: Ejection fraction ≤35%

D: Defibrillator shocks

H: Hospitalizations >1

E: Edema despite escalating diuretic agents

L: Low blood pressure, high heart rate

P: Prognostic medication – progressive intolerance or down-titration of GDMT

MADDOX, T, JANUZZI, J, ALLEN, L. ET AL. 2024 ACC EXPERT CONSENSUS DECISION PATHWAY FOR TREATMENT OF HEART FAILURE WITH REDUCED EJECTION FRACTION: A REPORT OF THE AMERICAN COLLEGE OF CARDIOLOGY SOLUTION SET OVERSIGHT COMMITTEE. J AM COLL CARDIOL. 2024 APR, 83 (15) 1444–1488.
HTTPS://DOI.ORG/10.1016/J.JACC.2023.12.024

When to REFER to Advanced Heart Failure

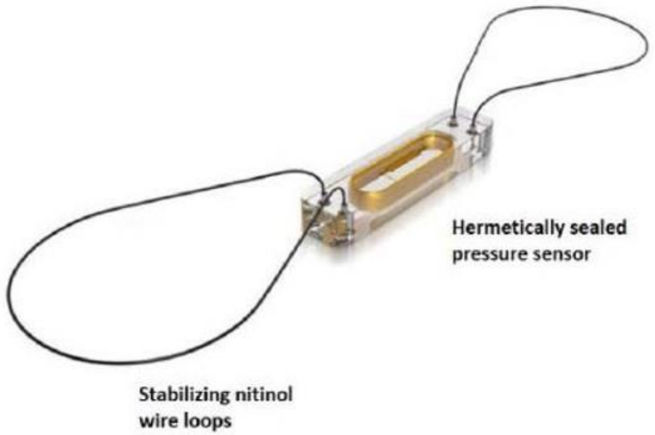
Chronic HF with high-risk features, such as development or persistence of 1 or more of the “i need help”

:•Need for chronic intravenous inotropes
•Persistent NYHA functional class III-IV symptoms of congestion or profound fatigue
•Systolic blood pressure ≤90 mm Hg or symptomatic hypotension
•Creatinine ≥1.8 mg/dL or BUN ≥43 mg/dL
•Onset of atrial fibrillation, ventricular arrhythmias, or repetitive ICD shocks
•2 or more emergency department visits or hospitalizations for worsening HF in the prior 12 months
•Inability to tolerate optimally dosed beta-blockers and/or ARNI/ACE inhibitors/ARBs and/or mineralocorticoid antagonists
•Clinical deterioration, as indicated by worsening edema, worsening symptoms, rising biomarkers (BNP, NT-proBNP, others), worsened exercise testing, decompensated hemodynamic status, or evidence of progressive remodeling on imaging
•High mortality risk using a validated risk model, such as the Seattle Heart Failure Model, for further assessment and consideration of advanced therapies

3.Persistently reduced LVEF ≤35% despite GDMT for ≥3 months: Refer for consideration of device therapy in those patients without prior placement of ICD or CRT, unless device therapy is contraindicated or inconsistent with overall goals of care

FOCUS ON MANAGING WITH TOOLS

- **Cardiomems**
- **HFMS** - radio frequency technology to detect changes in pulmonary fluid levels
- **Thoracic impedance** on ICDs





ATTR-CM Reference Sheet
Cardiology

As a cardiologist, you can help identify undiagnosed ATTR-CM patients by recognizing the signs and symptoms. This quick and easy reference sheet outlines potentially pertinent information to help identify ATTR-CM based on your organization's standards.

Signs & Symptoms

Your organization has highlighted these signs and symptoms for identifying potential ATTR-CM patients.

- HFpEF
- Low Voltage on ECG
- Left Ventricular Hypertrophy (>1.2cm)
- Abnormal/apical sparing on echo with strain
- Diastolic dysfunction
- History of TAVR or upcoming TAVR

Amyloidosis

Often unrecognized cause if heart failure in the elderly

Often misdiagnosed as HCM

Can cause AFib as well

Elderly patients with low flow low gradient aortic stenosis should be considered

FINAL TIDBITS

There is no guideline about which one to choose first

IS WHETHER USE OF A MINERALOCORTICOID ANTAGONIST IS MANDATORY BEFORE INITIATION OF AN ARNI.

SHORT ANSWER: NO.

NO DATA TO SUGGEST THAT A MINERALOCORTICOID ANTAGONIST IS MANDATORY BEFORE ARNI THERAPY, LACK OF TREATMENT WITH A MINERALOCORTICOID ANTAGONIST SHOULD NOT DELAY INITIATING OR SWITCHING A PATIENT TO AN ARNI.

However, these should all be in place by 3 months at the latest.



Recap

1. Know the risks and focus on **prevention**
2. Get the most therapy that the patient can tolerate
3. Review the **4 pillars**
4. Remember to look for **causes**



THANK YOU!

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REFERENCES

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1. Maddox T.M., Januzzi J.L., Allen L.A., et al. "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". J Am Coll Cardiol . 2021;77:772-810.



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