Outpatient Management of Heart Failure in Patients with Concomitant Renal Dysfunction

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2023 ICHP ANNUAL MEETING

Conflict of Interest

The speaker has no conflicts of interest to disclose regarding this presentation

Objectives

01

Categorize patients into appropriate classifications of heart failure based on the AHA/ACC/HFSA guideline for the management of heart failure.

02

Create a safe and effective treatment plan that is guideline directed and evidence based for the management of chronic heart failure in an outpatient setting.

03

Utilize currently available clinical research data to appropriately manage patients with heart failure and concomitant renal dysfunction.

What is Heart Failure?

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***

GREEN ZONE:	YELLOW ZONE:	RED ZONE:
You are in control. No action needed.	**Take action today. Call your doctor or nurse practitioner within 24 hours.**	**Take action now. Go to the Emergency Room or call 911.**
• I feel normal. • I can breathe as well as usual. • I have no swelling in my feet, ankles, legs or belly. • I can sleep as well as usual. • I do not have chest pain.	• I feel dizzy, light headed or fatigued. • I have more trouble breathing than usual. • I gained 2 pounds or more since yesterday, or 5 pounds in one week. • I have trouble sleeping flat, and need extra pillows or to sleep in a chair. • I have minimal chest pain.	• I am passing out or fainting. • I suddenly cannot breathe or have trouble breathing after sitting for 10 minutes. • I have new chest pain even after sitting for 10 minutes.

Gibson G, et al. American College of Cardiology. July 13, 2021.
https://health.umms.org/2022/01/07/heart-failure-warning-signs/

Patient Case Introduction

AB is a 62-year-old patient currently at your heart failure clinic after being discharged from the hospital. He was in the hospital for 5 days. Patient was admitted due to a 15 lbs. weight gain in 3 days and symptoms of fluid overload.

An echocardiogram was conducted at the hospital which showed a Left Ventricular Ejection Fraction of 38%. Patient was placed on IV diuretic at the hospital which markedly improved his symptoms.

Today AB is back at your clinic for a 5 day follow up. He reports no shortness of breath (SOB) at rest but almost always with any physical activity. He experiences SOB when walking around the house. He is not able to walk his dog for the last few days due to SOB and fatigue.

Vitals (today): Weight: 70 kg, BP 120/80, HR 62 BPM,
PMH: Hypertension (2018), Hypothyroidism (2010), Hyperlipidemia (2020),
Allergies: NKDA

Question 1:

- AB is a 62-year-old patient currently at your heart failure clinic after being discharged from the hospital. They were in the hospital for 5 days with a 15 lbs. weight gain in 3 days and symptoms of fluid overload. An echocardiogram was conducted at the hospital which showed a Left ventricular ejection fraction of 38%. Patient was placed on IV diuretic at the hospital which markedly improved their symptoms. Based on the information provided How would you classify AB's heart failure?

  A. Heart Failure with reduced Ejection Fraction (HFrEF)
  B. HF with mildly reduced EF (HFmrEF)
  C. HF with preserved EF (HFpEF)
  D. HF with improved EF (HFimpEF)

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1. Based on the information provided How would you classify AB's heart failure?

0

0%	0%	0%	0%
Heart Failure with reduced Ejection Fraction (HFrEF)	HF with mildly reduced EF (HFmrEF)	HF with preserved EF (HFpEF)	HF with improved EF (HFimpEF)

Heart Failure: Types

HF with reduced EF (HFrEF)

- HF with LVEF < 40%

HF with mildly reduced EF (HFmrEF)

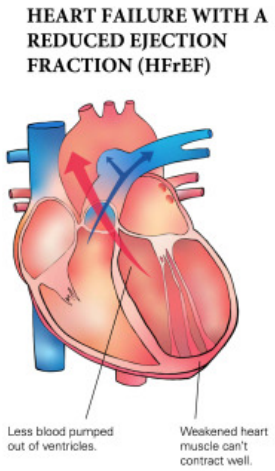
- HF with LVEF 41 – 49 %

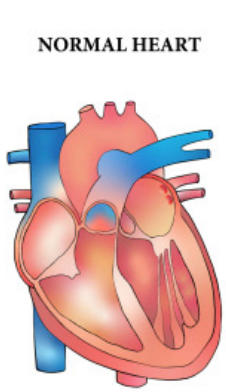
HF with preserved EF (HFpEF)

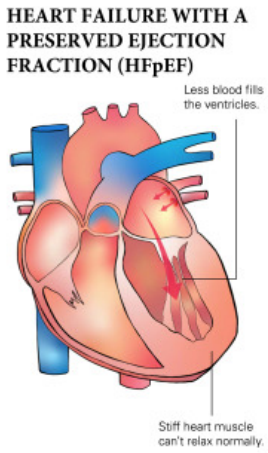
- HF with LVEF > 50%

HF with improved EF (HFimpEF)

- HF with baseline LVEF <40%, with a 10-point increase and improved EF >50%

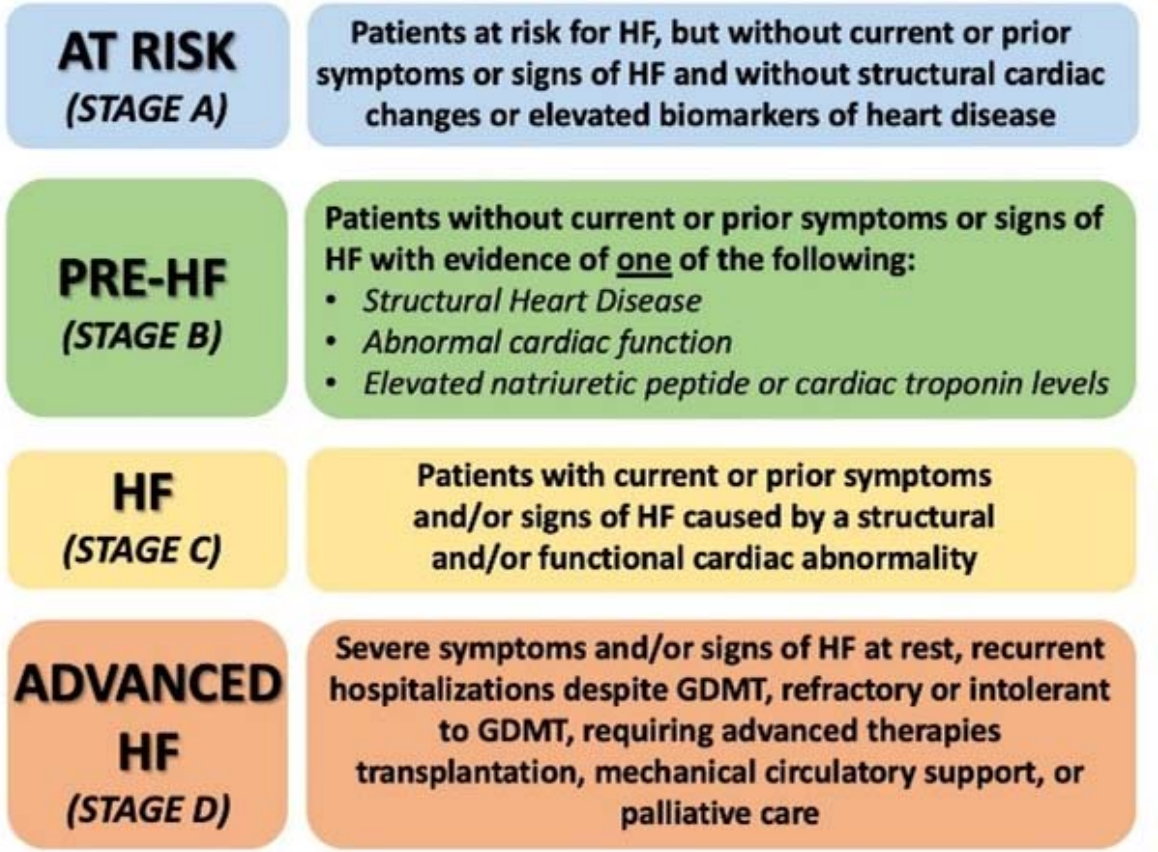






Heidenreich PA, et al. J Am Coll Cardiol 2022.
Ranek MJ et al. Chapter 5: Pathophysiology of heart failure and overview of Therapies. In Cardiovascular Pathology 5e.

Heart Failure Stages



Gibson G, et al. American College of Cardiology. July 13, 2021.

What stage would you classify our patient AB as?

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

Gibson G, et al. American College of Cardiology. July 13, 2021.

Question 2:

Today AB is back at your clinic for a 5 day follow up. He reports no shortness of breath (SOB) at rest but almost always with any physical activity. He experiences SOB when walking around the house. He is not able to walk his dog for the last few days due to SOB and fatigue.

Vitals (today): Weight: 70 kg, BP 120/80, HR 62 BPM,
PMH: Hypertension (2018), Hypothyroidism (2010), Hyperlipidemia (2020),
Allergies: NKDA

Which of the following is an appropriate functional classification for AB?

A. NYHA Class I
B. NYHA Class II
C. NYHA Class III
D. NYHA Class IV

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2. Which of the following is an appropriate functional classification for AB?

0

NYHA Class I	NYHA Class II	NYHA Class III	NYHA Class IV
0%	0%	0%	0%

Heart Failure: NYHA Classifications

NYHA Class	Subjective Definition
I	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).
II	Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea (shortness of breath).
III	Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea.
IV	Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increases.

NYHA: New York Heart Association

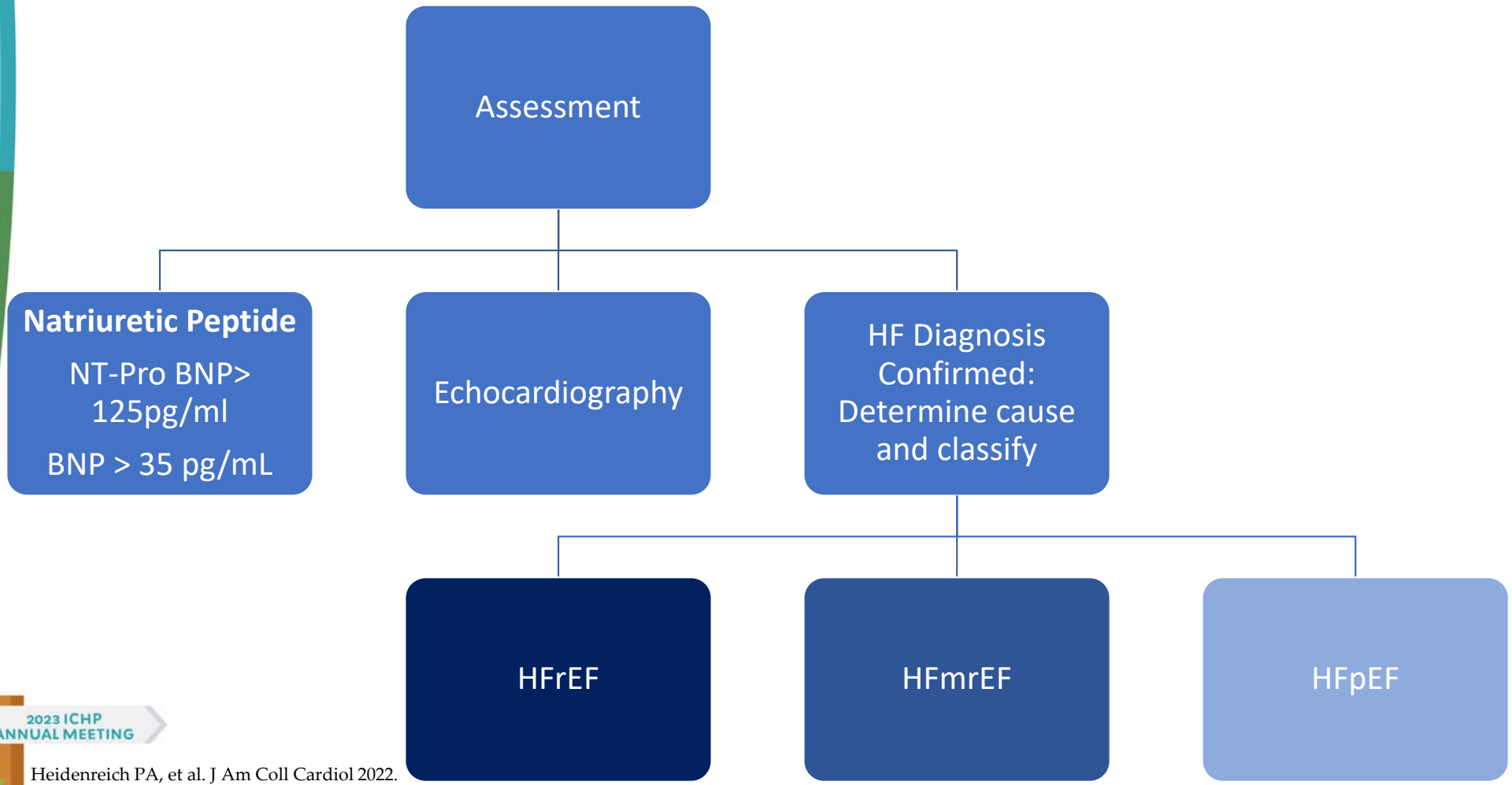
https://www.heart.org/en/health-topics/heart-failure/what-is-heart-failure/classes-of-heart-failure

AB is considered NYHA Class III today

NYHA Class	Subjective Definition
I	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).
II	Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea (shortness of breath).
III	**Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea.**
IV	Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increases.

https://www.heart.org/en/health-topics/heart-failure/what-is-heart-failure/classes-of-heart-failure

Assessment and Diagnosis Summary



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Heidenreich PA, et al. J Am Coll Cardiol 2022.

Patient Case

Today AB is back at your clinic for a 5 day follow up. He reports no Shortness of breath (SOB) at rest but almost always with any physical activity. He experiences SOB when walking around the house. He is not able to walk his dog for the last week due to SOB and fatigue.

Vitals (today): Weight: 70 kg, BP 120/80, HR 62 BPM,
PMH: Hypertension (2018), Hypothyroidism (2010), Hyperlipidemia (2020), HFrEF (Stage C, NYHA Class III)
Allergies: NKDA

Assume all labs are WNL at this time.

Medication List

1. Lisinopril 20 mg PO once daily
2. Rosuvastatin 5 mg PO daily
3. Levothyroxine 75 mcg PO every morning before breakfast
4. Metoprolol tartrate 50 mg PO once daily
5. Spironolactone 25 mg PO once daily
6. Furosemide 20 mg PO daily

Question 3:

Medication List

1. Lisinopril 20 mg PO once daily
2. Rosuvastatin 5 mg PO daily
3. Levothyroxine 75 mcg PO every morning before breakfast
4. Metoprolol tartrate 50 mg PO once daily
5. Spironolactone 25 mg PO once daily
6. Furosemide 20 mg PO daily

Based on AB's medication list, what are the medications treating AB's systolic dysfunction (HFrEF)?

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3. Based on AB's medication list, what are the medications treating AB's systolic dysfunction (HFrEF)? 0

Nobody has responded yet.

Hang tight! Responses are coming in.

Question 4:

Medication List
- Lisinopril 20 mg PO once daily
- Rosuvastatin 5 mg PO daily
- Levothyroxine 75 mcg PO every morning before breakfast
- Metoprolol Tartrate 50 mg PO once daily
- Spironolactone 25 mg PO once daily
- Furosemide 20 mg PO daily

Based on the medication list, Is AB on guideline-directed medical therapy (GDMT) for HF?

A. Yes
B. No
C. Maybe

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4. Based on the medication list, Is AB on guideline-directed medical therapy (GDMT) for HF?

0

Yes	No	Maybe
0%	0%	0%

Treatment Strategies

HFrEF, HFmrEF and HFpEF

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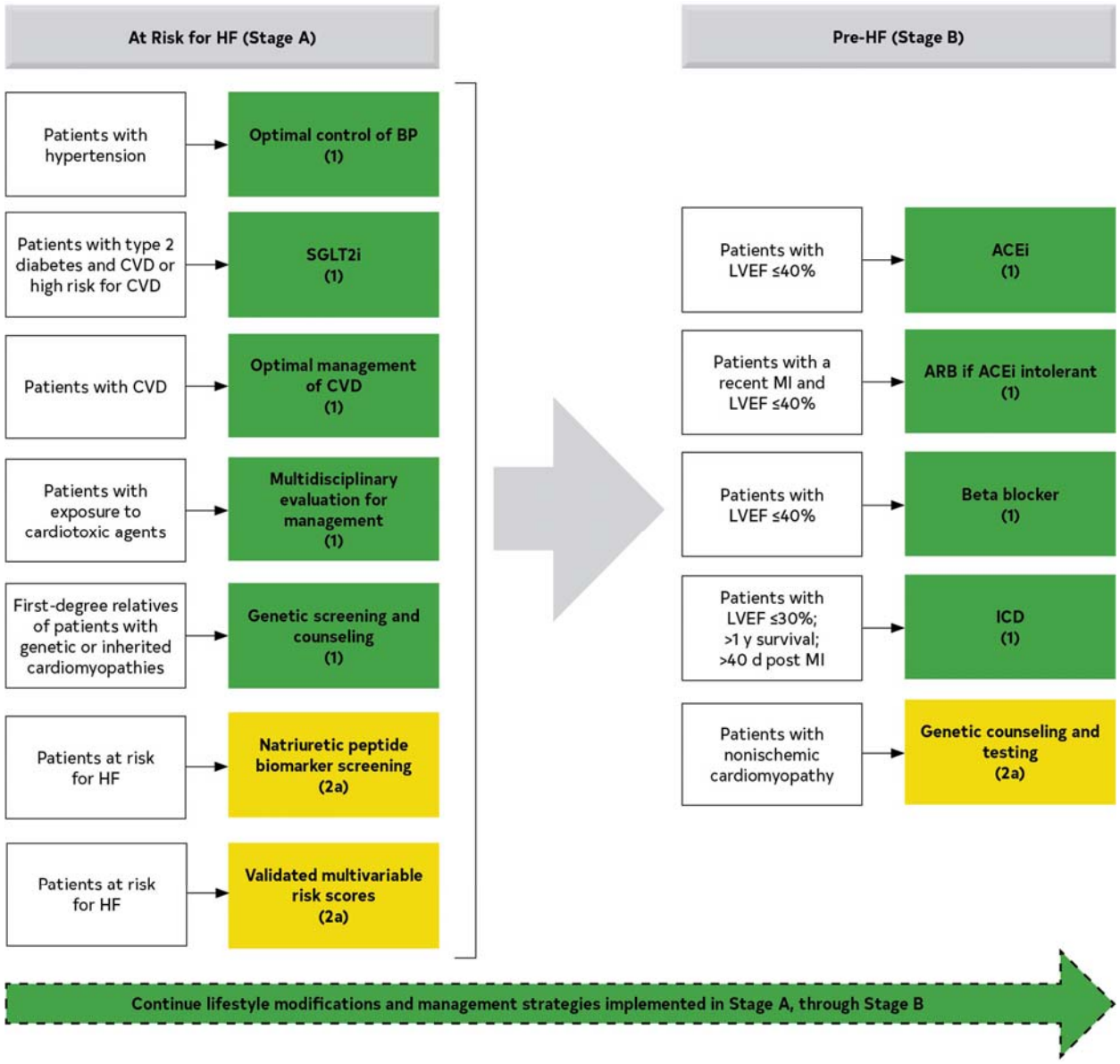
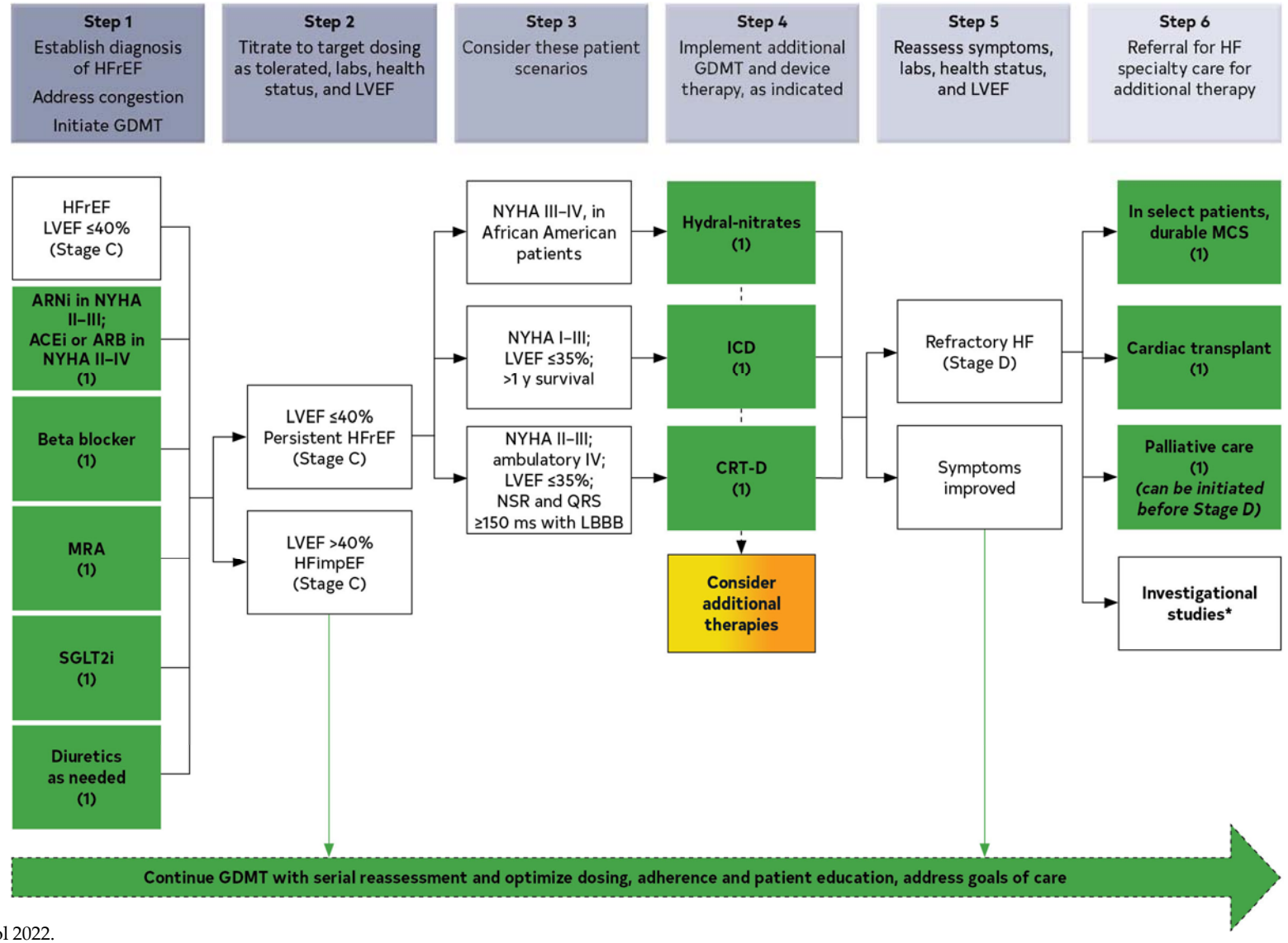
https://www.cardio.com/blog/understanding-your-heart-and-how-it-functions

Treatment Strategies: Stages A and B



Heidenreich PA, et al. J Am Coll Cardiol 2022.

Treatment Strategies: HFrEF



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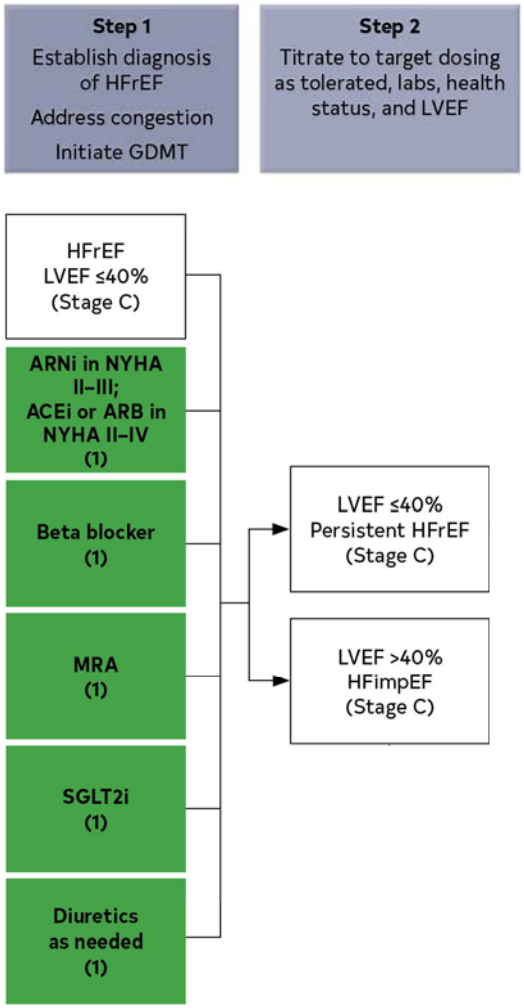
Treatment Strategies: HFrEF



AB is currently on ACEi, *Beta blocker* and MRA

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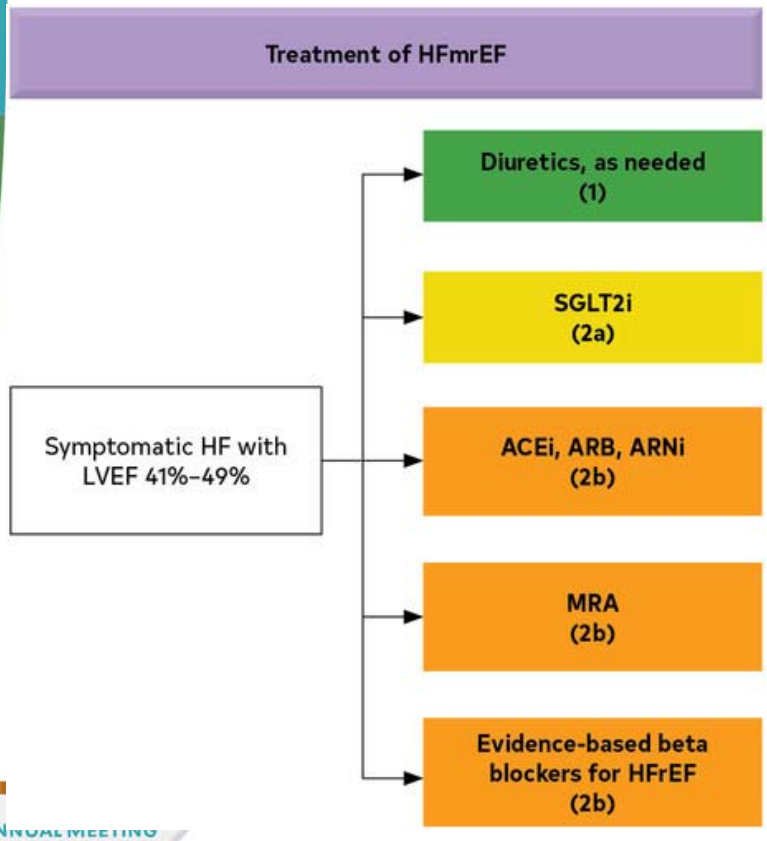
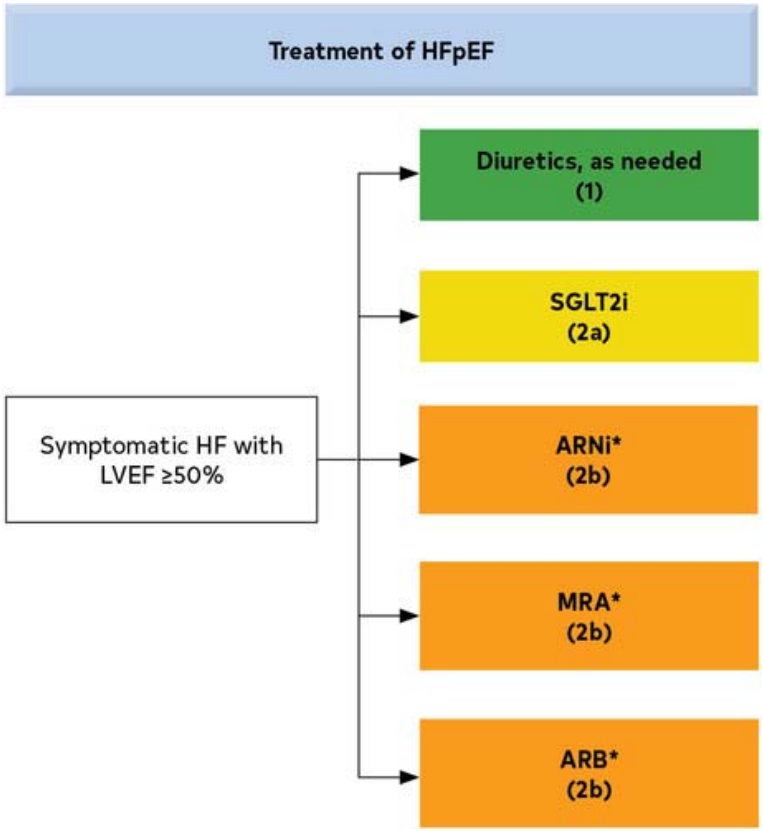
Heidenreich PA, et al. J Am Coll Cardiol 2022.

Treatment Strategies: HFmrEF and HFpEF





Heidenreich PA, et al. J Am Coll Cardiol 2022.

ACEi/ARB/ARNi

- Angiotensin receptor-neprilysin inhibitors (ARNi) recommended to reduce morbidity and mortality **(1A)**
- Use ACEi when ARNi is not feasible **(1A)**
- If already tolerating ACEi/ARB, replace with ARNi **(1A)**

ACEi = Angiotensin Converting Enzyme inhibitor
ARB: Angiotensin receptor Blocker
ARNi = Angiotensin receptor/neprilysin inhibitor

Heidenreich PA, et al. J Am Coll Cardiol 2022.

ACEi

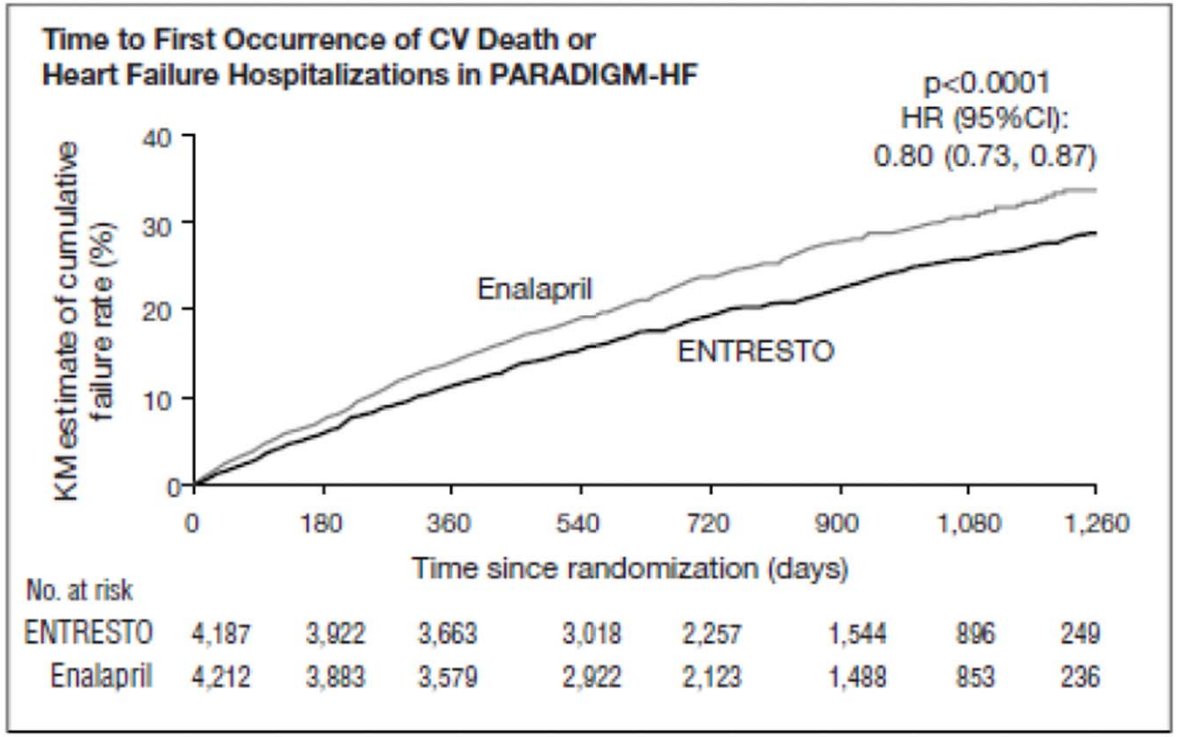
Medication	Initial Starting Dose	Target Dose
Captopril (Capoten®)	6.25 mg TID	25-50 mg TID
Enalapril (Vasotec®)	2.5 mg BID	10 mg BID
Fosinopril (Monopril®)	5-10 mg daily	80 mg daily
Lisinopril (Prinivil®, Zestril®)	**2.5-5 mg daily**	**20-40 mg daily**
Quinapril (Accupril®)	5 mg BID	80 mg daily
Rampril(Altace®)	1.25-2.5 mg daily	10 mg daily
Trandolapril (Mavik®)	1 mg daily	4 mg daily
Benazepril (Lotensin®)	5 mg daily	40 mg daily

ARB

Medication	Initial Starting Dose	Target Dose
Candesartan (Atacand®)	4-8 mg daily	32 mg daily
Losartan (Cozaar®)	12.5-25 mg daily	150 mg daily
Valsartan (Diovan®)	40 mg BID	160 mg BID
Irbesartan (Avapro®)	50 mg daily	300 mg daily

Angiotensin Receptor-Neprilysin Inhibitors (ARNi)

- Sacubitril/valsartan – (Entresto)
  - Neprilysin Inhibitor/ARB
  - Sacubitril (24mg, 49mg or 97mg) and valsartan (26 mg, 51mg or 103mg)
- Paradigm-HF trial
  - Reduced CV death/hospitalizations in comparison to enalapril (21.8 % vs 26.5 %)
- If on ACE-I, must washout for 36 hours before starting ARNi



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Heidenreich PA, et al. J Am Coll Cardiol 2022.
McMurray JV. *N Engl J Med* 2014.

Beta Blockers

- Use of 1 of the 3 beta-blockers proven to reduce mortality is recommended to reduce mortality and hospitalizations (1A)

Beta Blockers	Trial
Bisoprolol (Zebeta®)	CIBIS II
Carvedilol (Coreg®)	COPERNICUS
Metoprolol succinate (Toprol XL®)	MERIT HF

AB is currently on Metoprolol Tartrate?

Heidenreich PA, et al. J Am Coll Cardiol 2022.
Foody JM et al. *JAMA*. 2002

Beta Blockers

Beta Blocker	Initial Starting Dose	Target Dose
Bisoprolol (Zebeta®)	1.25 mg daily	10 mg daily
Carvedilol (Coreg®)	3.125 mg BID	25 mg BID
Carvedilol CR (Coreg CR®)	10 mg daily	80 mg daily
Metoprolol succinate (Toprol XL®)	12.5 – 25 mg daily	200 mg daily

Mineralocorticoid Receptor Antagonists

- Mineralocorticoid receptor antagonists (MRAs) recommended for patients with NYHA class II-IV to reduce morbidity and mortality **(1A)**
  - MRAs are not recommended when eGFR < 30 or potassium > 5.0 **(Level IIIB) = Harm**
- RALES
  - Spironolactone
- EPHESUS
  - Eplerenone

AB is currently on Spironolactone

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Heidenreich PA, et al. J Am Coll Cardiol 2022.

Mineralocorticoid Receptor Antagonists (MRAs)

Medication	Initial Starting Dose	Maximum Daily Dose
Spironolactone (Aldactone®)	12.5 – 25 mg daily	25-50 mg daily
Eplerenone (Inspra®)	25 mg daily	50 mg daily

MRAs

	Spironolactone	Eplerenone
Trial Name	**RALES**	**EPHESUS**
Patients	1663 patients with NYHA class III/IV HF and LVEF < 35% on ACE-I, loop and digoxin	6632 patients with HF s/p MI or LVEF < 40% and diabetes on optimal therapy (ACE, BB, diuretic +/- digoxin)
Intervention	25 mg spironolactone daily vs. placebo	Eplerenone 25 mg (titrate to 50 mg) daily vs. placebo
Endpoints	Death from all causes Hospitalizations	Death from any cause Death from CV causes or hospitalizations
Results	30% reduction in risk of death 35% reduction in hospitalizations	RR death 0.85 in eplerenone group (p=0.008) Death from CV causes and hospitalizations reduced w/eplerenone
Side Effects	10% gynecomastia in men on spironolactone vs. 1% placebo, hyperkalemia similar	Serious hyperkalemia 5.5% vs. 3.9 % (p=0.002), gynecomastia similar

Sodium/Glucose Cotransporter-2 Inhibitors (SGLT2i)

- SGLT2i recommended to reduce hospitalizations and cardiovascular mortality, irrespective of presence of type II diabetes or ejection fraction **(1A)**
- DAPA- HF
  - Dapagliflozin (Farxiga)
- EMPEROR- Reduced
  - Empagliflozin (Jardiance)

What SGLT2i is AB taking?

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Heidenreich PA, et al. J Am Coll Cardiol 2022.

Sodium/Glucose Cotransporter-2 Inhibitors (SGLT2i)

Medication	Dosing	Renal Dosing
Empagliflozin (Jardiance)	10 mg daily	Studied in eGFR > 20 mL/min
Dapagliflozin (Farxiga)	10 mg daily	Studied in eGFR > 30 mL/min

Diuretics

- Diuretics recommended to improve congestion, improve symptoms, and prevent worsening heart failure **(Level 1B)**
- Loop diuretics are the drugs of choice

- Thiazide
  - May be used in conjunction with loop diuretics in patients with diuretic resistance
  - Metolazone (Zaroloxyn®)
    - Given 30 mins to 1 hour prior to loop diuretic

AB is currently on Furosemide

Heidenreich PA, et al. J Am Coll Cardiol 2022.

Diuretics

Medication	Initial Starting Dose	Maximum Daily Dose
Furosemide (Lasix®)	20 mg daily or BID	600 mg
Bumetanide (Bumex®)	0.5 – 1 mg daily or BID	10 mg
Torsemide (Demedex®)	10 – 20 mg daily	200 mg
Ethacrynic acid (Edecin®)	25 mg daily or BID	200 mg

Hydralazine/Nitrates

- For African American patients with NYHA III-IV who are on GDMT, the combination of hydralazine and isosorbide dinitrate is recommended to improve symptoms and reduce mortality **(1A)**
- Hydralazine/nitrates can be useful in patients who cannot receive an ACE/ARB/ARNI (in place of ACE/ARB) **(IIbC)**
- Two RCTs, V-HeFT I (Vasodilator Heart Failure Trial) and A-HeFT (African-American Heart Failure Trial)

Should we start AB on Hydral/Nitrates?

Heidenreich PA, et al. J Am Coll Cardiol 2022.

Hydralazine/Nitrates

Medication	Initial Starting Dose	Target Dose
Hydralazine/Isosorbide dinitrate (BiDil®)	37.5 mg/20 mg TID	75 mg/40 mg TID
Hydralazine (Apresoline®)	37.5 mg 4x/daily	75 mg 4x/daily
Isosorbide dinitrate (Isordil®)	20 mg 4x/daily	40 mg 4x/daily

Additional Therapies

Ivabradine (Corlanor)

- For patients with symptomatic (NYHA class II to III) stable chronic HFrEF (LVEF <=35%) on GDMT, including a beta blocker at maximum tolerated dose, and who are in sinus rhythm with a heart rate of >=70 bpm at rest, ivabradine can be beneficial to reduce HF hospitalizations and cardiovascular death (2a)

Digoxin

- In patients with symptomatic HFrEF despite GDMT (or who are unable to tolerate GDMT), digoxin might be considered to decrease hospitalizations for HF (2b)

Vericiguat

- In selected high-risk patients with HFrEF and recent worsening of HF already on GDMT, an oral soluble guanylate cyclase stimulator (vericiguat) may be considered to reduce HF hospitalization and cardiovascular death (2b)

Heidenreich PA, et al. J Am Coll Cardiol 2022.

GDMT = Guideline directed medical therapy

Mortality Benefits

TABLE 15 Benefits of Evidence-Based Therapies for Patients With HFrEF (3-6,8,10-14,23,31-42)

Evidence-Based Therapy	Relative Risk Reduction in All-Cause Mortality in Pivotal RCTs, %	NNT to Prevent All-Cause Mortality Over Time*	NNT for All-Cause Mortality (Standardized to 12 mo)	NNT for All- Cause Mortality (Standardized to 36 mo)
ACEi or ARB	17	22 over 42 mo	77	26
ARNi†	16	36 over 27 mo	80	27
Beta blocker	34	28 over 12 mo	28	9
Mineralocorticoid receptor antagonist	30	9 over 24 mo	18	6
SGLT2i	17	43 over 18 mo	63	22
Hydralazine or nitrate‡	43	25 over 10 mo	21	7
CRT	36	12 over 24 mo	24	8
ICD	23	14 over 60 mo	70	23

Heidenreich PA, et al. J Am Coll Cardiol 2022.

HFpEF Treatment Summary

SGLT2i

- Decrease HF hospitalizations and *cardiovascular mortality* (2a)
- EMPEROR – Preserved

MRAs

- Decrease hospitalizations, particularly among patients with LVEF on the lower end of this spectrum (2b)
- TOPCAT Trial

ARBs

- Decrease hospitalizations, particularly among patients with LVEF on the lower end of this spectrum (2b)
- CHARM-Preserved

ARNi

- Decrease hospitalizations, particularly among patients with LVEF on the lower end of this spectrum (2b)
- PARAGON- HF

Heidenreich PA, et al. J Am Coll Cardiol 2022.

Patient Case

Today AB is back at your clinic for a 5 day follow up. He reports no Shortness of breath (SOB) at rest but almost always with any physical activity. He experiences SOB when walking around the house. He is not able to walk his dog for the past few days due to SOB and chest discomfort.

Vitals (today): Weight: 70 kg, BP 120/80, HR 62 BPM,
PMH: Hypertension (2018), Hypothyroidism (2010), Hyperlipidemia (2020), HFrEF (Stage C, NYHA Class III)
Allergies: NKDA

Assume all labs are WNL at this time.

Medication List

1. Lisinopril 20 mg PO once daily
2. Rosuvastatin 5 mg PO daily
3. Levothyroxine 75 mcg PO every morning before breakfast
4. Metoprolol tartrate 50 mg PO once daily
5. Spironolactone 25 mg PO once daily
6. Furosemide 20 mg PO daily

Question 5:

Medication List

- Lisinopril 20 mg PO once daily
- Rosuvastatin 5 mg PO daily
- Levothyroxine 75 mcg PO every morning before breakfast
- Metoprolol tartrate 50 mg PO once daily
- Spironolactone 25 mg PO once daily
- Furosemide 20 mg PO daily

Based on the treatment strategies we discussed, what changes (if any), will you make to AB's therapy for HFrEF?

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5. Based on the treatment strategies we discussed, what changes (if any), will you make to AB's therapy for HFrEF? 0

Nobody has responded yet.

Hang tight! Responses are coming in.

Patient case

HF Medication List

1. Lisinopril 20 mg PO once daily → **May Switch to ARNi**
2. Metoprolol Tartrate 50 mg PO once daily→ **Switch to succinate**
3. Spironolactone 25 mg PO once daily
4. Furosemide 20 mg PO daily→ **May titrate the dose up**
5. **May add SGLT2i**

Question 6:

Vitals (today): Weight: 54 kg, BP 120/80, HR 62 BPM,
PMH: Hypertension (2018), Hypothyroidism (2010), Hyperlipidemia (2020), HFrEF (Stage C, NYHA Class III)
Allergies: NKDA

Updated HF Medication List
1. Entresto (sacubitril/valsartan) __/__mg PO twice daily (was taking Lisinopril 20 mg daily)
2. Metoprolol Succinate 50 mg PO once daily
3. Spironolactone 25 mg PO once daily
4. Furosemide 40 mg PO daily
5. Jardiance (empagliflozin) 10 mg PO daily

What dose of Entresto (sacubitril/valsartan) will you start AB on?

A. 24/26

B. 49/51

C. 97/103

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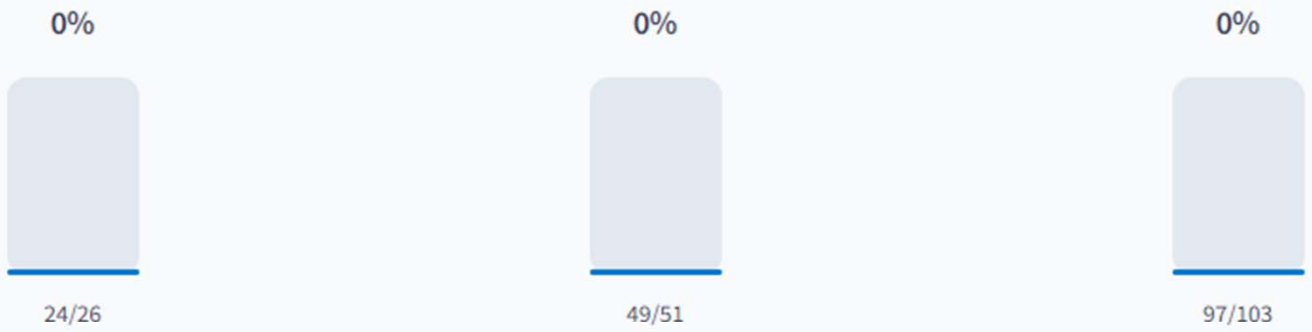
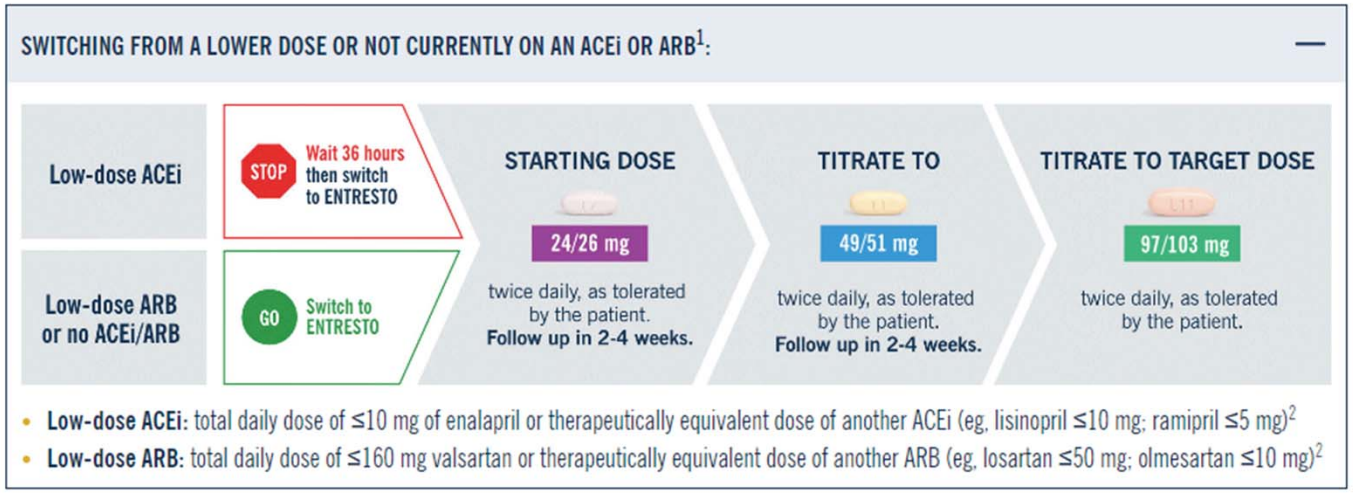
6. What dose of Entresto (sacubitril/valsartan) will you start AB on?

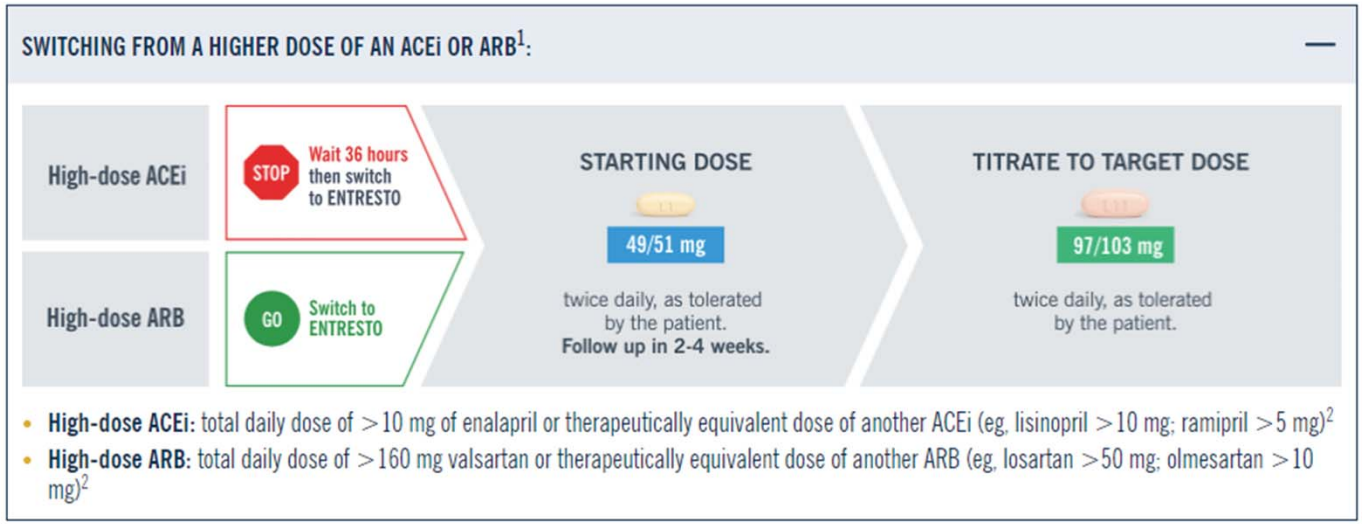
0



Switching to ARNi

AB is currently taking lisinopril 20 mg





2023 ICHP ANNUAL MEETING

https://www.entrestohcp.com/

Question 7:

AB is back at your clinic for follow up. He is overall feeling well with no SOB, palpitations or edema. He is able to perform all daily functions with little to no limitations. His recent ECHO showed an improvement in his EF to 45%.

AB reports that he has been diagnosed chronic kidney disease stage II and is following up with a nephrologist.

Vitals (today): Weight: 54 kg, BP 105/60, HR 62
Allergies: NKDA

Pertinent Labs
Na: 142
K: 4.6
eGFR: 63 mL/min

HF Medication List
Entresto (sacubitril/valsartan) 97/103 mg PO BID
Metoprolol succinate 50 mg PO daily
Jardiance (empagliflozin) 10 mg PO daily
Spironolactone 25 mg PO daily

Based on the information available what changes, if any, will you make to the patient's treatment regiment?

A. Stop Spironolactone
B. Stop Entresto (sacubitril/valsartan)
C. Stop Jardiance (empagliflozin)
D. No Changes

075 - Asish - Heart Failure

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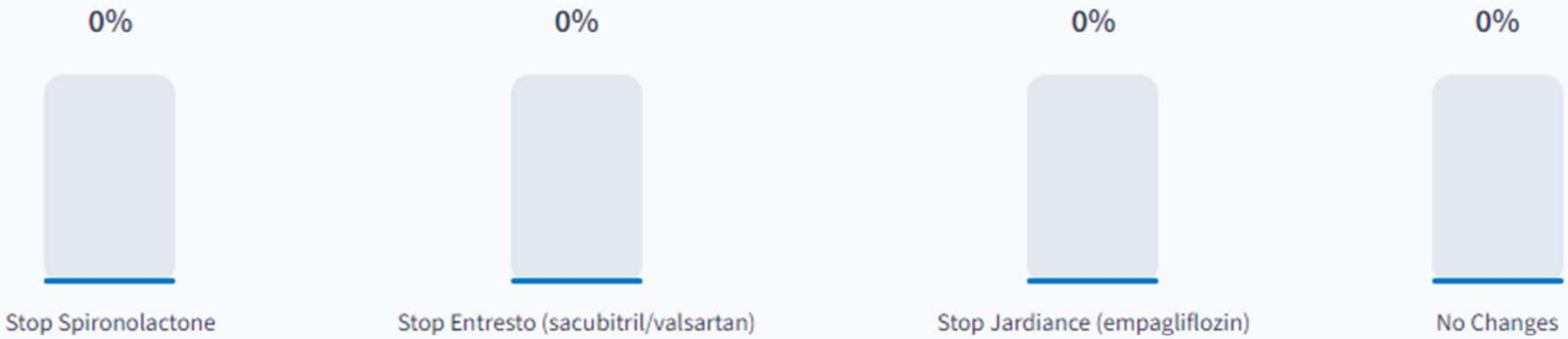
7. Based on the information available what changes, if any, will you make to the patient's treatment regiment?

0



Question 8:

A few months later AB is back at the clinic. He reports occasional feelings of dizziness and light headedness. No SOB or edema. Patients last labs show worsening renal function

Vitals (today): Weight: 54 kg, BP 105/60, HR 62
Allergies: NKDA

Pertinent Labs
Na: 142
K: 5.2
eGFR: 25 mL/min

HF Medication List
Entresto (sacubitril/valsartan) 97/103 mg PO BID
Metoprolol succinate 50 mg PO daily
Jardiance (empagliflozin) 10 mg PO daily
Spironolactone 25 mg PO daily

Based on the information available what changes, if any, will you make to the patient's treatment regiment?

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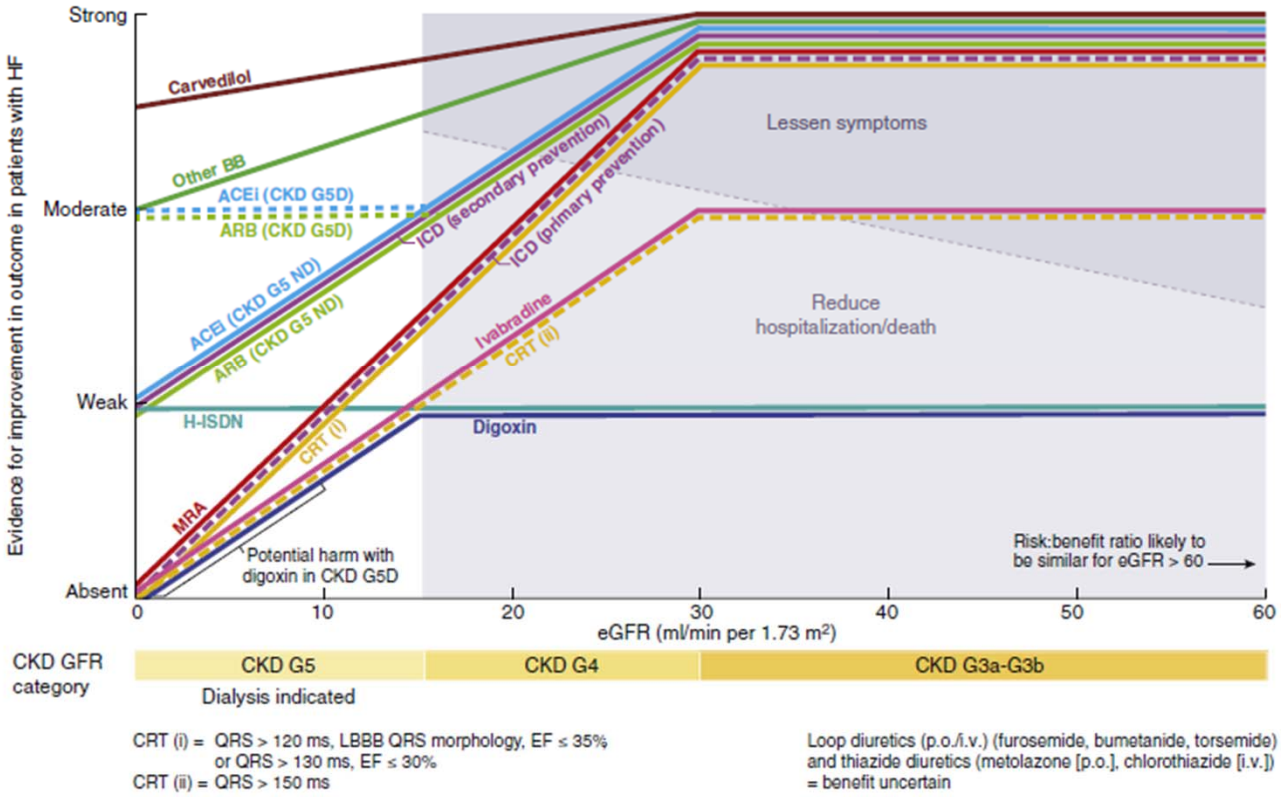
8. Based on the information available what changes, if any, will you make to the patient's treatment regiment?

Nobody has responded yet.

Hang tight! Responses are coming in.

Evidence on HF Outcomes in Patients with CKD



Banerjee D et al. Clinical Journal of the American Society of Nephrology. 2021

Stage 1 with normal or high GFR (GFR > 90 mL/min)

Stage 2 Mild CKD (GFR = 60-89 mL/min)

Stage 3A Moderate CKD (GFR = 45-59 mL/min)

Stage 3B Moderate CKD (GFR = 30-44 mL/min)

Stage 4 Severe CKD (GFR = 15-29 mL/min)

Stage 5 End Stage CKD (GFR <15 mL/min)

GFR: Glomerular Filtration Rate

Clinical Characteristics of Patients in HF Studies

Trial, yr	Age and Diabetes	< Creatinine (mean) or > GFR
Angiotensin-converting enzyme inhibitors		
SAVE 1992 (53)	59 yr, 29%	<2.5 mg/dl
SOLVD 1991 (54)	61 yr, 26%	<2.5 mg/dl (1.2 mg/dl)
SOLVD prevent 1992 (55)	59 yr, 15%	<2.5 mg/dl (1.2 mg/dl)
Angiotensin receptor blockers		
CHARM 2003 (56)	66 yr, 28%	<3 mg/dl
β-Blockers		
CIBIS II 1999 (30)	61 yr, 12%	<3.4 mg/dl
COPERNICUS 2001 (31)	63 yr, 26%	<2.8 mg/dl (1.4 mg/dl)
MERIT HF 1999 (29)	63 yr, 25%	—
SENIORS (32)	76 yr, 27%	<2.8 mg/dl (1.15 mg/dl)
Mineralocorticoid receptor antagonists		
RALES 1999 (57)	65 yr, NA	<2.5 mg/dl
EMPHASIS-HF 2011 (58)	69 yr, 34%	>30 ml/min (1.1 mg/dl)
EPHESUS 2003 (59)	64 yr, 32%	<2.5 mg/dl (1.1 mg/dl)
Angiotensin receptor neprilysin inhibitors		
PARADIGM HF 2014 (26).	64 yr, 35%	>30 ml/min (1.1 mg/dl)
Ivabradine		
SHIFT 2010 (60)	61 yr, 30%	(74 ml/min per 1.73 m^2)
Cardiac resynchronization therapy		
RAFT 2010 (45)	66 yr, 30%	51% patients <60 ml/min per 1.73 m^{2a}
SGLT2 inhibitor		
DAPA-HF 2019 (36)	66 yr, 41%	>30 ml/min per 1.73 m^2
EMPEROR-reduced 2020	67 yr, 50%	>20 ml/min per 1.73 m^2

Banerjee D et al. Clinical Journal of the American Society of Nephrology. 2021

Table 2. Pharmacotherapy of heart failure in patients with CKD

Agents	CKD Stages 1– 3	CKD Stages 4 and 5
ACEis	Should be used in all patients with HFrEF, with monitoring of creatinine and potassium	May be used in HFrEF, with monitoring of creatinine and potassium. Dose modification may be necessary
β-Blockers	Should be used in all patients with HFrEF	May be used in HFrEF
Mineralocorticoid receptor antagonists	Should be used in HFrEF, with careful monitoring of potassium	May be used in HFrEF, with caution and monitoring of potassium
ARBs	Should be used in all patients with HFrEF with caution	May be used in HFrEF, with monitoring of creatinine and potassium
Ivabradine	May be used in patients with HFrEF with sinus rhythm and who are stable on β-blockers	Unknown effects
Angiotensin receptor and neprilysin inhibitor	May be used in patients with HFrEF instead of ACEis/ARBs	Unknown effects
Sodium-glucose cotransporter 2 inhibitor	Can be used in patients with HFrEF with or without diabetes	Unknown effects
Hydralazine and isosorbide dinitrate	Should be considered in patients with HFrEF who are intolerant to ACEis/ARBs	May be considered in patients with HFrEF who are intolerant to ACEis/ARBs

ACEi, angiotensin-converting enzyme inhibitor; HFrEF, heart failure with reduced ejection fraction; ARB, angiotensin receptor blocker.

Management of Patients HF and Renal Dysfunction

ACEi/ARB/ARNi

- ACEi vs ARB
- ARNi
  - eGFR ≥30 mL/minute/1.73 m^2: No dosage adjustment necessary
  - eGFR <30 mL/minute/1.73 m^2: Initiate Sacubitril 24 mg/valsartan 26 mg twice daily and titrate based on response/tolerability
  - Dialysis
    - Similar to eGFR < 30 mL/min

Beta Blockers

- No dose adjustment necessary
- Dialysis
  - Carvedilol vs Metoprolol vs Bisoprolol

AB's eGFR is currently 25 mL/min

- Entresto 97/103 mg PO BID
- Metoprolol succinate 50 mg PO daily
- **What should we do?**

Cice G et al. J Am Coll Cardiol. 2001
Lexi-Drugs. Lexicomp. Wolters Kluwer Health, Inc. Riverwoods, IL.
Entresto [package insert]. East Hanover, New Jersey: Novartis Pharmaceuticals Inc.; 2021.

Management of Patients HF and Renal Dysfunction

SGLT2i

- eGFR ≥20 mL/minute/1.73 m^2: 10 mg once daily
- eGFR <20 mL/minute/1.73 m^2: Not recommended (insufficient data)

- Farxiga (dapagliflozin)
  - eGFR >25 mL/minute/1.73 m^2 : 10 mg once daily
  - eGFR <25 mL/minute/1.73 m^2: Initiation of therapy no recommended however, if already on dapagliflozin may continue 10 mg once daily
- Dialysis
  - Contraindicated

AB's eGFR is currently 25 ml/min

- Spironolactone 25 mg PO daily and Jardiance 10 mg PO daily **What should we do?**

Lexi-Drugs. Lexicomp. Wolters Kluwer Health, Inc. Riverwoods, IL.
Jardiance [package insert]. Ridgefiel, CT; Boehringer Pharmaceuticals, Inc.; 2022.
Farxiga [package insert]. Wilmington, DE; AstarZeneca Pharmaceuticals, Inc.; 2020.

Management of Patients HF and Renal Dysfunction

MRAs

- Spironolactone
  - eGFR >50 mL/minute/1.73 m^2: No initial dosage adjustment necessary.
  - eGFR 30 to 50 mL/minute/1.73 m^2: Initial 12.5 mg once daily or every other day, maximum target dose of 25 mg/day.
  - eGFR <30 mL/minute/1.73 m^2: Use not recommended
- Eplerenone
  - eGFR ≥50 mL/minute/1.73 m^2: No initial dose adjustment necessary.
  - eGFR 31 to 49 mL/minute/1.73 m^2: Initial 25 mg every other day, maximum target dose of 25 mg once daily
  - eGFR ≤30 mL/minute/1.73 m^2: Not recommended
- Dialysis
  - Not usually recommended

AB's eGFR is currently 25 ml/min

- Spironolactone 25 mg PO daily and Jardiance 10 mg PO daily **What should we do?**

Lexi-Drugs. Lexicomp. Wolters Kluwer Health, Inc. Riverwoods, IL.
Jardiance [package insert]. Ridgefiel, CT; Boehringer Pharmaceuticals, Inc.; 2022.
Farxiga [package insert]. Wilmington, DE; AstarZeneca Pharmaceuticals, Inc.; 2020.

Question 9:

A few months later AB is back at the clinic. He denies feelings of dizziness and light headedness. No SOB or edema. **Patient now has end stage renal disease and is on Hemodialysis 3 times a week (MWF)**

Vitals (today): Weight: 54 kg, BP 95/60, HR 62
Allergies: NKDA

Pertinent Labs
Na: 142
K: 4.4

HF Medication List
Entresto (sacubitril/valsartan) 49/51 mg PO BID
Metoprolol succinate 50 mg PO daily
Jardiance (empagliflozin) 10 mg PO daily

What is the most appropriate change, if any, to make to AB's therapy today?

A. Stop Jardiance
B. Stop metoprolol succinate
C. Stop Entresto and Jardiance
D. No changes

075 - Asish - Heart Failure

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9. What is the most appropriate change, if any, to make to AB's therapy today?

0

0%	0%	0%	0%
Stop Jardiance	Stop metoprolol succinate	Stop Entresto and Jardiance	No changes

Key Takeaways

HF is a clinical syndrome - Systolic or Diastolic dysfunction

Appropriate management of patients should be guideline-driven and patient-centered

Monitoring renal function and electrolytes is crucial in guiding therapy

075 - Asish - Heart Failure

Moderate | Visual settings | Edit

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Questions?

0

Nobody has responded yet.

Hang tight! Responses are coming in.