

(PBL) Managing Acute and Chronic Heart Failure

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Dr. Kinkade is the medical director for the family medicine inpatient service at University Hospital in Columbia, Missouri. He earned his medical degree from the University of Texas School of Medicine in Houston and completed a family medicine residency at Martin Army Community Hospital at Fort Benning, Georgia. Previously, he was director of undergraduate medical education in the military at Fort Hood, Texas, and at the University of Texas Southwestern Medical School in Dallas. He was a master educator fellow at the University of Missouri and earned a doctorate in education from the University of North Texas.

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Learning Objectives

1. Practice applying new knowledge and skills gained from Managing Acute and Chronic Heart Failure sessions, through collaborative learning with peers and expert faculty.
2. Identify strategies that foster optimal management of acute and chronic heart failure, within the context of professional practice.
3. Formulate an action plan to implement practice changes, aimed at improving patient care.

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Associated Session

- Managing Acute and Chronic Heart Failure

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Case 1: Chief Complaint

“I’m here for my blood pressure”

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History of Present Illness

54 year-old African-American man here for routine follow up of HTN. He is not checking blood pressures at home.

He is somewhat limited in his ability to walk by knee pain, but does not report any angina or shortness of breath.

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Past Medical History

Hypertension

Osteoarthritis of the knee

Depression

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Medications, Allergies

HCTZ 25 mg daily

atenolol 50 mg daily

fluoxetine 20 mg daily

naproxen sodium 500 mg bid

NKDA

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Immunizations

Up-to-date

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Family History

Father – CAD s/p CABG at age 70

Mother – hypertension, hypothyroidism

Brother – CAD s/p PCI at age 57

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Social History

Married, 2 children in high school. Works in a bank, mostly sedentary.

Quit smoking 20 years ago after 5 pack-year history

Drinks 2-4 beers per week

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Physical Examination

Height 72", weight 248, BMI 33

BP 148/90, P 72, RR 14, O2 sat 96%, afebrile

Normal mental status

Head/Neck – normal, no JVD

CV – RRR, no murmur, (+) S4, no edema

Chest – clear, unlabored

Abd – soft, no masses or bruits

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Laboratory/Radiology

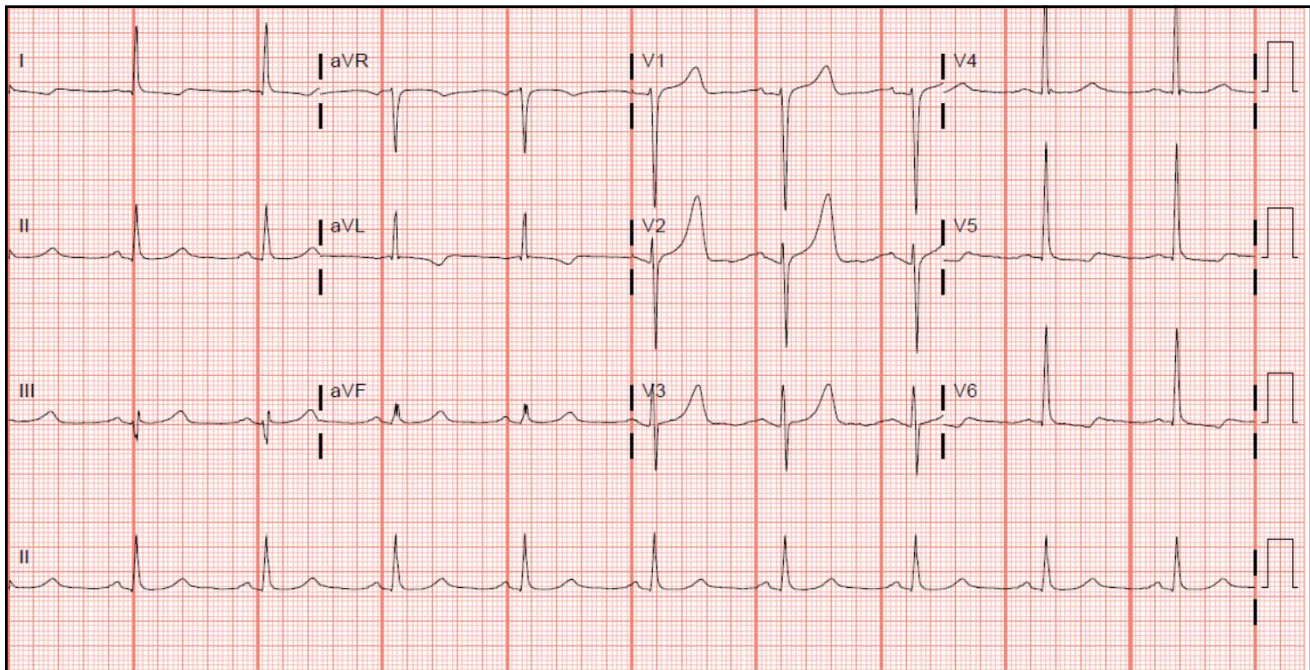
BUN 25, Cr 1.2 (both up from his baseline)

Na 138, K⁺ 3.6, Glucose 115

Total Chol 240; Trig 272

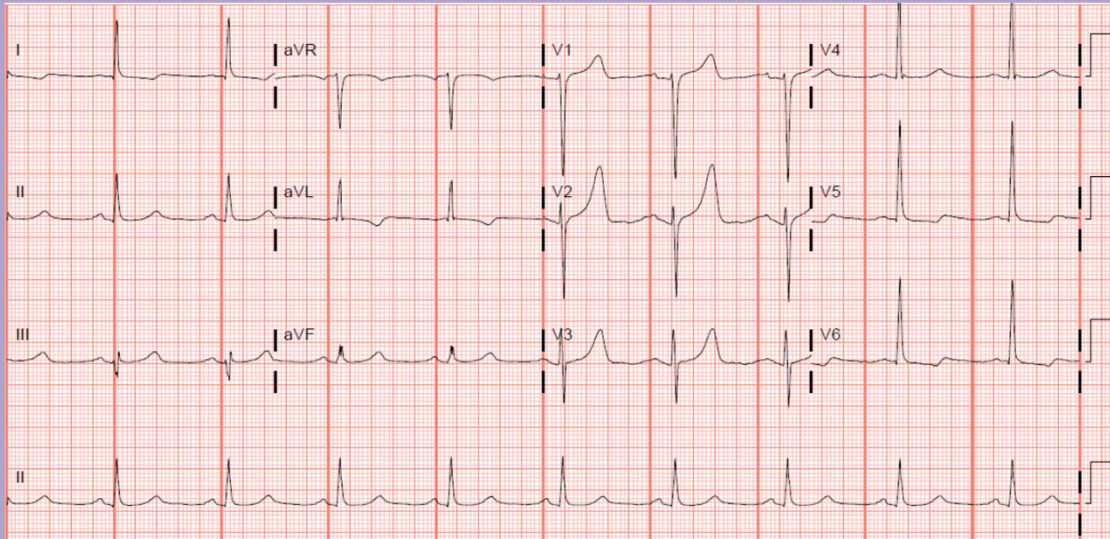
ECG next slide

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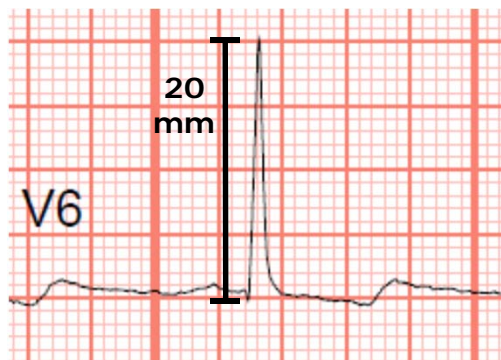
Q1 What does the ECG show?



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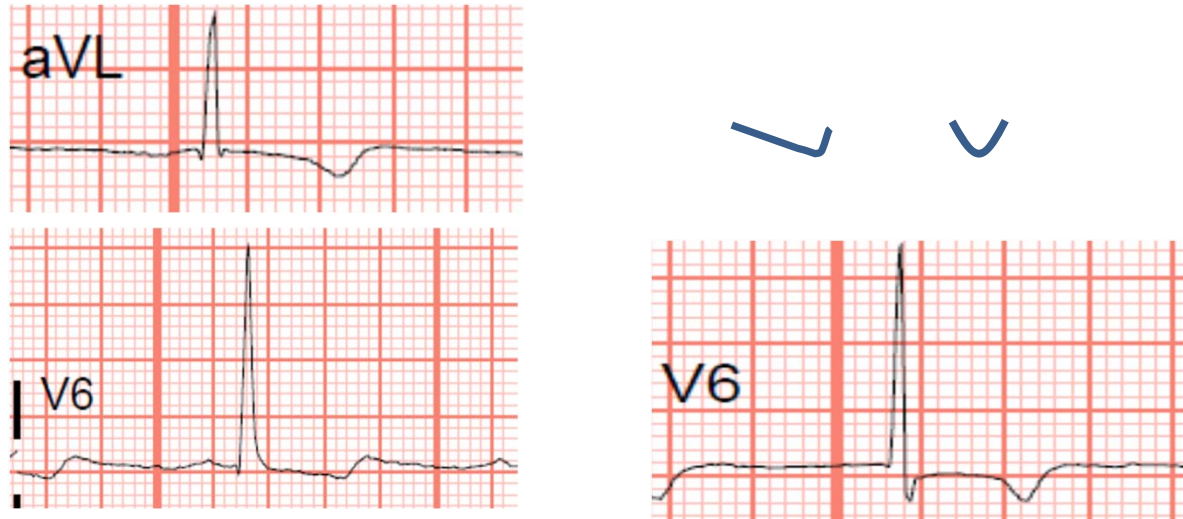
Q1: Answer

B. Left ventricular hypertrophy



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Q1: Answer



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You decide to order an echocardiogram

LV wall thickness moderately increased

Concentric hypertrophy of the LV

LV systolic function normal

LV ejection fraction: 65 %

Doppler parameters consistent with class 2 diastolic dysfunction.

Increased mean LA pressure.

LA is moderately dilated

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Q2

Does this patient have heart failure? If so, what stage or class? Do you recommend any treatment?

Current meds:

HCTZ 25 mg daily
atenolol 50 mg daily
fluoxetine 20 mg daily
naproxen sodium 500 mg bid

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Q2: Answer B

ACC/AHA heart failure staging

- A:** High Risk for HF, no structural damage or signs/symptoms
- B:** Structural damage, no signs/symptoms
- C:** Structural damage with prior or current signs/symptoms
- D:** Refractory requiring specialized intervention

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Stage B HF recommendations

In pts with a history of MI and reduced EF, ACE inhibitors or ARBs should be used	I	A
In pts with MI and reduced EF, evidence-based beta blockers should be used	I	B
In pts with MI, statins should be used to prevent HF	I	A
In pts with structural cardiac abnormalities, including LV hypertrophy, in the absence of a history of MI or ACS, blood pressure should be controlled in accordance with clinical practice guidelines for hypertension to prevent symptomatic HF	I	A
ACE inhibitors should be used in all pts with a reduced EF to prevent HF	I	A
Beta blockers should be used in all pts with a reduced EF to prevent HF	I	C
An ICD is reasonable in pts with asymptomatic ischemic cardiomyopathy who are at least 40 d post-MI, have an LVEF \leq 30%, and on GDMT	IIa	B
Nondihydropyridine calcium channel blockers may be harmful in patients with low LVEF	III: Harm	C

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Case 2: Chief Complaint

“I get short of breath easily”

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History of Present Illness

64 year-old white man presenting to the ED with complaints of shortness of breath on exertion and weight gain (10-15 pounds)

6 months ago he could walk the length of Bourbon Street (13 blocks). Now he can only walk 1 block.

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Past Medical History

Hypertension

Hyperlipidemia

OA of the shoulder

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Medications, Allergies

Atorvastatin 20 mg

Lisinopril 20 mg/HCTZ 12.5 mg

Ibuprofen 400 mg TID

NKDA

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Immunizations

Up-to-date

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Family History

Father – multiple myeloma age 78

Mother – hypertension, T2 DM, ESRD

No known family hx of CAD or HF

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Social History

Retired casino card dealer. Married.

Non-smoker

Drinks 1 Hurricane per day



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Physical Examination

Height 70", weight 228, BMI 31

BP 134/78, P 72, RR 14, O2 sat 93%, afebrile

Normal mental status

Head/Neck – normal, JVD to angle of the jaw at 45°

CV – RRR, no murmur, 2+ edema above ankle

Chest – slightly labored, rales lower 1/3 lung field

Abd – soft, no masses or bruits

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Laboratory/Radiology

Na 134, K⁺ 3.8, Glucose 122

BUN 18, Cr 0.9

Total Chol 178; Trig 122; HDL 41; LDL 107

NT-proBNP 2,888 Trop I <0.01

CXR – Mild cardiomegaly, pulmonary edema, small bilateral effusions

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Additional studies

ECG – NSR, no ischemic changes

Echocardiogram:

Mildly dilated LV, LVEF 30%, normal wall motion, class 1 diastolic dysfunction

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Q3

What are your initial management steps for the patient?

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Q4: Management of acute decompensated HF

1. IV diuresis with furosemide
2. Daily weights, BMP
3. ? Salt, fluid restriction
4. Evaluate for etiology or reason for decompensation
5. D/C offending meds
6. Optimize evidence-based therapies
7. Patient education

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ADHF - diuresis

- IV preferred
- Higher dose more effective than lower dose
- Goal 3-5L per day during acute phase (1-3L net deficit)
- Worsening of renal function does not portend worse prognosis

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ADHF – offending meds

- NSAIDS, COX 2 inhibitors
- Calcium-channel blockers
- Tricyclic antidepressants
- Thiazolidinediones
- Dipeptidyl peptidase-4 inhibitors
- Alpha 1-blockers – doxazosin, terazosin
- Anti-cancer drugs
- Sympathomimetic stimulants

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Sodium containing meds

- | | |
|---------------------------|---------------|
| • Kayexelate 60 ml | 1200 mg/60 ml |
| • Pip/tazo 3.375 gm Q6 | 800 mg |
| • Metronidazole 500 IV Q8 | 938 mg |
| • Colyte, Golytely 1L | 1.46 g |

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Case 2: continued

By day 4 you have diuresed your patient 9L and his weight drops from 228 → 208 lbs.

He does not have elevated JVP or edema. He has no orthopnea or oxygen requirement.

BMP:

Na 137

K 3.7

Bun 18 → 21

Cl 101

HCO₃ 25

Cr 0.9 → 1.1

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Q4

What med change(s) do you want to make at D/C?

Admission meds:

Atorvastatin 20 mg

Lisinopril 20 mg/HCTZ 12.5 mg

Ibuprofen 400 mg TID

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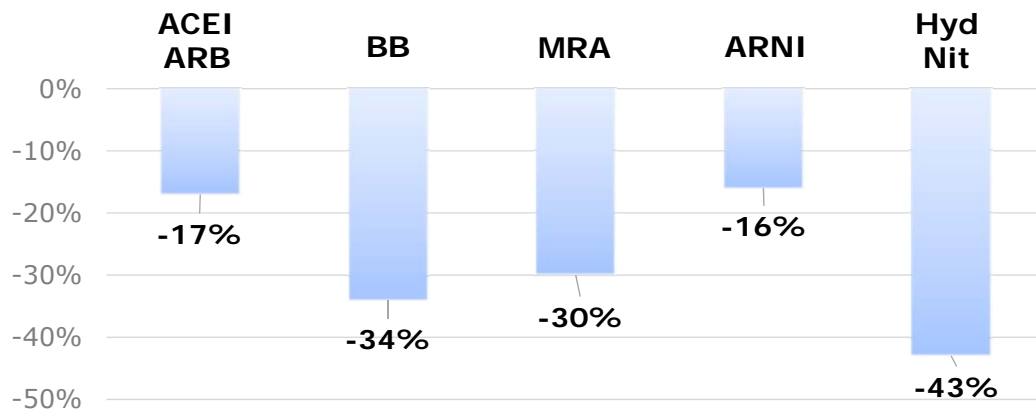
HFrEF – ACEI and ARB

Drug	Initial Daily Dose(s)	Target Doses(s)	Mean Doses Achieved in Clinical Trials
<i>ACE Inhibitors</i>			
Captopril	6.25 mg 3 times	50 mg 3 times	122.7 mg/d
Enalapril	2.5 mg twice	10 to 20 mg twice	16.6 mg/d
Lisinopril	2.5 to 5 mg once	20 to 40 mg once	32.5 to 35.0 mg/d
<i>ARBs</i>			
Candesartan	4 to 8 mg once	32 mg once	24 mg/d
Losartan	25 to 50 mg once	150 mg once	129 mg/d
Valsartan	20 to 40 mg twice	160 mg twice	254 mg/d

Circulation 2017; 136(6):e137-e161

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RRR in all-cause mortality from RCTs



adapted from JAMA Cardiol.2016;1:714-717

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Case 3

64 yo retired casino dealer, hospitalized for newly diagnosed heart failure 3 months ago and seen in clinic twice since then.

Now with c/o occasional PND and mild swelling in lower extremities. He can walk 4-5 blocks on level ground without symptoms.

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Case 3: Medications

Lisinopril 20 mg daily
Furosemide 20 mg daily
Carvedilol 12.5 mg 2x/day
Atorvastatin 20 mg daily
Tylenol 100 mg 2-3x/day

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Case 3: Physical Exam

Height 70", weight 198
BP 118/68, P 68, RR 14, O2 sat 96%
Normal mental status
Head/Neck – normal, No JVD at 45°, no HJR
CV – RRR, no murmur, 1+ non pitting edema ankles
Chest – clear

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Case 3: Labs

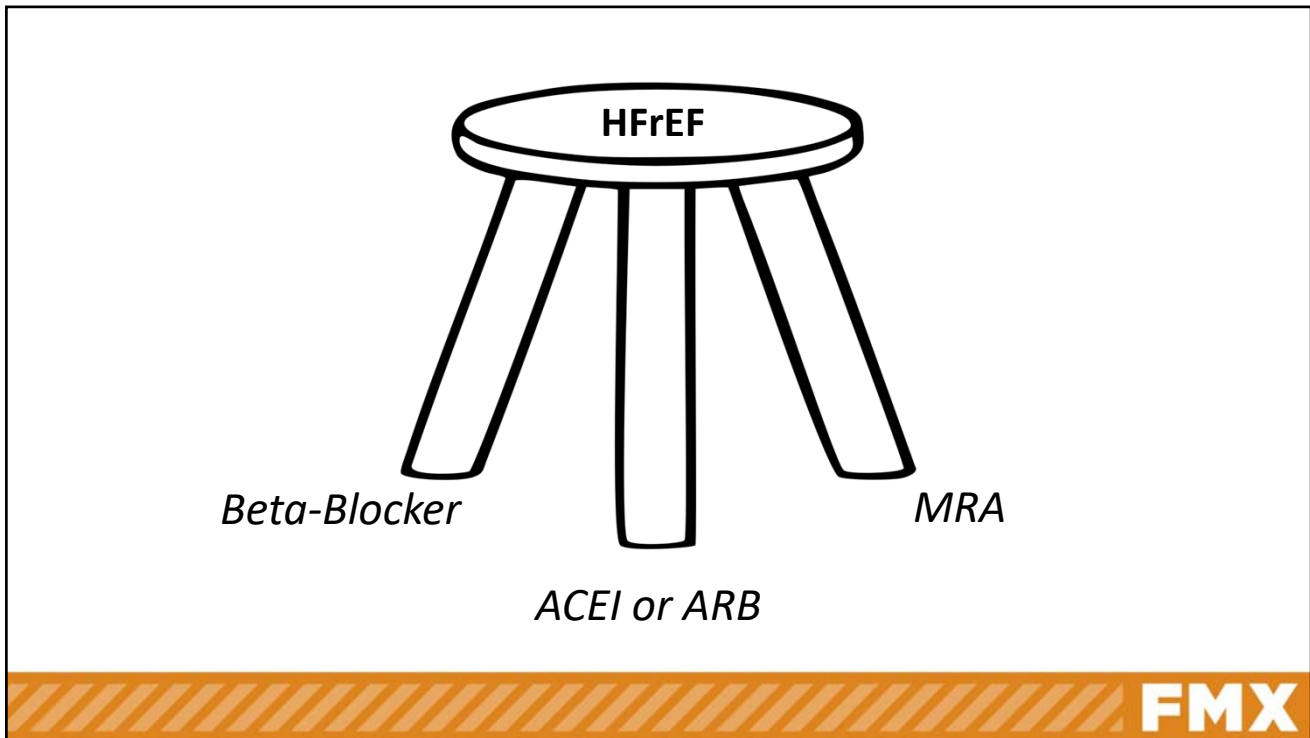
Na	138	Cl	104	Bun	19
K+	4.1	HCO ₃	27	Cr	1.2
NT-pro BNP	488 ng/dl				

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Q5: What is the best next step?

- A. Increase lisinopril to 40 mg daily
- B. Increase carvedilol to 25 mg 2x/day
- C. Add spironolactone 12.5 mg daily
- D. Add hydralazine 25 mg and isosorbide dinitrate 20 mg 3x/daily
- E. Add sacubitril/valsartan 24/26 mg 2x/daily

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Minimizing the Risk of Hyperkalemia with Aldosterone Antagonists

- The risk increases with serum creatinine >1.6
- In elderly or low muscle mass use creatinine clearance >30
- Don't initiate with serum $K^+ >5.0$ mEq/L.
- Risk of hyperkalemia is increased with higher doses of ACE inhibitors
- K^+ supplements should discontinued or reduced

Recommended to check K^+ and creatinine in 3 d and at 1 wk after initiating therapy and at least monthly for the first 3 mo

Circulation. 2013;128:e240-e327

Q6

Your patient now asks to start sacubitril/valsartan. Is he a candidate? If so, are there any precautions?

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2017 Update: ARNI

COR	LOE	Recommendations	Comment/ Rationale
I	ACE-I: A	The clinical strategy of inhibition of the renin-angiotensin system with ACE inhibitors (Level of Evidence: A), <u>OR</u> ARBs (Level of Evidence: A), <u>OR</u> ARNI (Level of Evidence: B-R) in conjunction with evidence-based beta blockers, and aldosterone antagonists in selected patients, is recommended for patients with chronic HF _r EF to reduce morbidity and mortality.	NEW: New clinical trial data prompted clarification and important updates.
	ARB: A		
	ARNI: B-R		

Circulation 2017; 136:e137-e161

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2017 Update: ARNI

COR	LOE	Recommendations	Comment/ Rationale
I	ARNI: B-R	In patients with chronic symptomatic HF _r EF NYHA class II or III who tolerate an ACE inhibitor or ARB, replacement by an ARNI is recommended to further reduce morbidity and mortality.	NEW: New clinical trial data necessitated this recommendation.

Circulation 2017; 136:e137-e161

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2017 Update: ARNI

COR	LOE	Recommendations	Comment/ Rationale
III: Harm	C-EO	ARNI should not be administered to patients with a history of angioedema.	NEW: New clinical trial data.
III: Harm	B-R	ARNI should not be administered concomitantly with ACE inhibitors or within 36 hours of the last dose of an ACE inhibitor.	NEW: Available evidence demonstrates a potential signal of harm for a concomitant use of ACE inhibitors and ARNI.

Circulation 2017; 136:e137-e161

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PARADIGM-HF - Sacubitril/Valsartan

PARADIGM-HF (n=8,400)

- Systolic BP \geq 95 mm Hg, eGFR \geq 30 ml/min/1.73 m² and serum K \leq 5.4 mEq/L at randomization
- B-blocker (93%), MRA (54%)
- Washout of ACEI for 36 hours prior to starting sacubitril/valsartan

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Case 3 continued

Now that your 64 yo male with HFrEF is relatively stable. He has no PND and can ambulate 1-2 blocks.

Meds:

carvedilol 25 mg 2x/day

sacubitril/valsartan 40/51 mg 2x/day

spironolactone 25 mg 1x/day

furosemide 20 mg 1x/day

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Exam: BP 115/64, P 84, Lungs clear, trace LE edema
ECG: NSR, LVH, QRS 105 ms
Echo: LVEF has increased from 30% to 40%

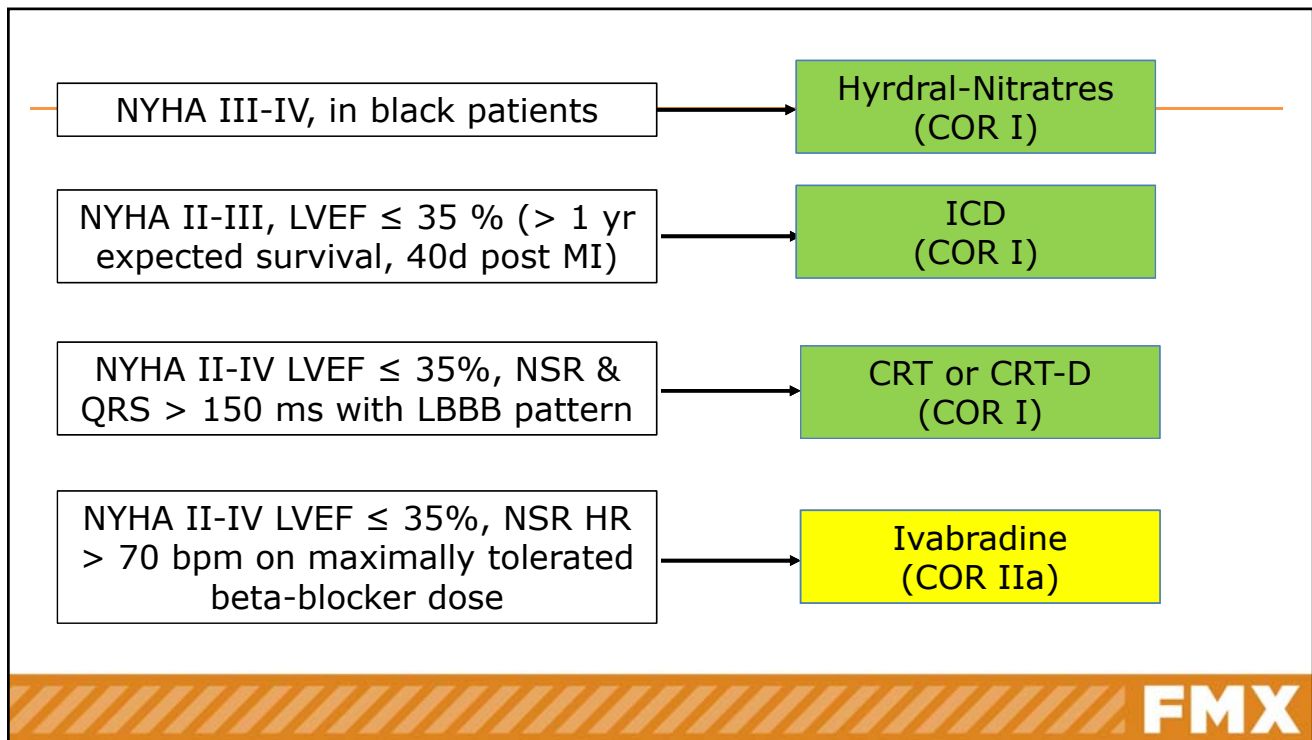
Your patient asks if he is doing everything he can for his heart failure. You think back to these talks and review your guidelines to see if there is anything else you should be doing for him.

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Q7

Your patient asks if he is doing everything he can for his heart failure. You think back to these talks and review your guidelines to see if there is anything else you should be doing for him.

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Recommendations: GDMT for Stage C HFrEF

1. ACE-inhibitor (or ARB if ACEI side effects)
2. Evidence based Beta-blocker
3. Aldosterone Antagonist
4. Sacubitril/valsartan
5. Hydralazine/isosorbide dinitrate
6. Cardiac resynchronization therapy
7. Implantable cardiac defibrillator

Questions



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Contact Information

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