You are working in the internal medicine clinic at Beebe. Today your first patient is 70-year-old J.M., a man who has been coming to the clinic for several years for management of coronary artery disease (CAD) and hypertension (HTN). A cardiac catheterization done a year ago showed 50% stenosis of the circumflex coronary artery. He has had episodes of dizziness for the past 6 months and orthostatic hypotension, shoulder discomfort, and decreased exercise tolerance for the past 2 months. On his last clinic visit 3 weeks ago, a chest x-ray (CXR) examination revealed cardiomegaly and a 12-lead electrocardiogram (ECG) showed sinus tachycardia with left bundle branch block. You review J.M.'s morning blood work and initial assessment.

Laboratory Results

Chemistry

Sodium	142 mEq/L (142 mmol/L)
Chloride	95 mEq/L (95 mmol/L)
Potassium	3.9 mEq/L (3.9 mmol/L)
Creatinine	0.8 mg/dL (70.7 mcmol/L)
Glucose	82 mg/dL (4.6 mmol/L)
BUN	19 mg/dL (6.8 mmol/L)

Complete Blood Count

WBC	5400/mm^3 (5.4 x 10^9/L)
Hgb	11.5 g/dL (115 g/L)
Hct	37%
Platelets	229,000/mm^3 (229 x 10^9/L)

Initial Assessment

J.M. reports increased fatigue and shortness of breath, especially with activity, and "waking up gasping for breath" at night, for the past 2 days.

Vital Signs

Temperature	97.9 ° F (36.1 ° C)
Blood pressure	142/83
Heart rate	105 beats/min
Respiratory rate	18 breaths/min

1. Highlight the lab results that cause you concern and explain why.

Heart Rate of 105 indicates Tachycardia

Hemoglobin of 11.5 g/dL and Hematocrit of 37% indicate mild anemia.

2. Knowing his history and seeing his condition this morning, what further questions are you going to ask J.M. and his daughter?

- How often do you experience short breath and what activities trigger it
- What is your typical diet consistent of
- Ask the daughter about any changes in activity

CASE STUDY PROGRESS

J.M. tells you he becomes exhausted and has shortness of breath climbing the stairs to his bedroom and must lie down and rest ("put my feet up") at least an hour twice a day. He has been sleeping on 2 pillows for the past 2 weeks. He has not salted his food since the provider told him not to because of his high blood pressure, but he admits having had ham and a small bag of salted peanuts 3 days ago. He states that he stopped smoking 10 years ago. He denies having palpitations but has had a constant, irritating, nonproductive cough lately.

3. You think it's likely that J.M. has heart failure (HF). From his history, what do you identify as probable causes for his HF?

- Coronary Artery Disease (CAD)- His cardiac Cath showed 50% stenosis

- HTN- can lead to left ventricular hypertrophy and eventual heart failure

- Age- At 70 years old, he is at increased risk of heart failure

4. For each potential assessment finding listed, specify whether it is associated with left-sided HF or right-sided HF.

Potential Assessment Finding	Left-Sided HF	Right-Sided HF
a. Weakness	X	
b. Jugular (neck) vein distention		x
c. Dependent edema (legs and sacrum)		x
d. Hacking cough, worse at night	x	
e. Enlarged liver and spleen		x
f. Exertional dyspnea	x	
g. Distended abdomen		x
h. Weight gain		x
i. S_3/S_4 gallop	x	
j. Crackles and wheezes in lungs	x	

CASE STUDY PROGRESS

The provider confirms your suspicions and indicates that J.M. is experiencing symptoms of early left-sided heart failure. A two-dimensional (2D) echocardiogram is ordered. Medication orders are written.

Medication Orders

Enalapril 10 mg PO twice a day
Furosemide 20 mg PO every morning
Carvedilol 6.25 mg PO twice a day
Digoxin 0.5 mg PO now, then 0.125 mg PO daily
Potassium chloride 10-mEq tablet PO once a day

5. For each medication listed, identify its class and describe its purpose in treating HF.

Enalapril: Reduces workload on the heart by dilating blood vessels and decreasing blood pressure. Class: ACE

Furosemide: Removes excess fluid from the body by increasing urine output, reducing fluid overload and congestion. Class: Loop Diuretic

Carvedilol: Reduces heart rate and blood pressure, improves heart function and survival in heart failure. Class: Beta Blocker

Digoxin: Increases the force of heart contractions and helps control heart rate.
Class: Cardiac glycoside

Potassium chloride: Prevents potassium depletion caused by furosemide therapy.

Class: Electrolyte supplement

6. When you go to remove the medications from the RX Station, you see that carvedilol (Coreg ER) is stocked. Will you give it to J.M.? Explain.

No. Coreg ER is the extended-release form of carvedilol, while the prescription specifically calls for regular carvedilol to be given twice daily. These formulations are not interchangeable.

7. As you remove the digoxin tablet from the automated medication dispensing machine, you note that the dose on the tablet label is 250 mcg. How many tablets would you give?

For the first dose of 0.5 mg (500 mcg), give 2 tablets of 250 mcg each. Then you would give ½ tablet for a dose of 0.125

8. Based on the new medication orders, which blood test or tests will be monitored carefully? Explain your answer.

- **Potassium levels:** Due to combined effects of furosemide (which depletes potassium) and enalapril (which can increase potassium)
- **Digoxin levels:** To ensure therapeutic range and prevent toxicity
- **Renal function (BUN, creatinine):** To monitor effects of ACE inhibitor and diuretic therapy

9. When you give J.M. his medications, he looks at the potassium tablet, wrinkles his nose, and tells you he “hates those horse pills.” He tells you a friend of his said he could eat bananas instead. He says he would rather eat a banana every day than take one of those pills. How will you respond?

while bananas are a good source of potassium, they don't provide enough to replace what's lost from the diuretic. His supplement provides controlled dose. The prescription ensures he gets the exact amount needed.

10. The echocardiogram shows that J.M.’s left ventricular ejection fraction (EF) is 49%. Explain what this test result means with regard to J.M.’s heart function.

An EF of 49% means J.M.'s heart is pumping slightly below normal (normal range is 50-70%). This indicates mild systolic dysfunction, where his heart is ejecting only 49% of the blood volume in the left ventricle with each contraction

CASE STUDY PROGRESS

This is J.M.’s first episode of significant HF. Before he leaves the clinic, you want to teach him about lifestyle modifications he can make and monitoring techniques he can use to prevent or minimize future problems.

11. List 5 suggestions you might make and the rationale for each.

- **Daily weight monitoring - Sudden weight gain can indicate fluid retention**
- **Limit sodium intake to 2000mg/day - Reduces fluid retention and blood pressure**
- **Regular moderate exercise as tolerated - Improves cardiac function and overall health**
- **Keep a symptom diary - Helps track changes and identify early warning signs**
- **Take medications as prescribed - Ensures optimal management of heart failure**

12. You tell J.M. that the combination of high-sodium foods he had during the past several days might have contributed to his present episode of HF. He looks surprised. J.M. says, “But I didn’t add any salt to them!” To what health care professional could J.M. be referred to help him understand how to prevent future crises? State your rationale.

Send J.M. to a heart health dietitian. They can teach him about salt in everyday foods - even foods that don't taste salty. The dietitian will show him how to read food labels and help create an easy-to-follow meal plan that works for him and keeps his salt intake low.

13. After visiting with the cardiac dietitian, you review potential food choices with J.M. Which foods are high in sodium and must be avoided? *Select all that apply.*

a. Fresh fruits

b. Canned soups

c. Cheddar cheese

d. Processed meats

e. Whole wheat bread

f. Fat-free fruit yogurt

g. Canned vegetables

14. You also include teaching about digoxin toxicity. When teaching J.M. about the signs and symptoms of digoxin toxicity, which will be included? *Select all that apply.*

a. Diarrhea

b. Visual changes

c. Increased urine output

d. Loss of appetite or nausea

e. Dizziness when standing up

END