

# Cardiovascular Disorders



## Case Study 1 Heart Failure

**Difficulty:** Beginning

**Setting:** Emergency department, hospital

**Index Words:** heart failure (HF), cardiomyopathy, volume overload, patient education

**Giddens Concepts:** Fluid and Electrolyte Balance, Perfusion, Patient Education

**HESI Concepts:** Assessment, Fluid and Electrolyte, Perfusion, Patient Education

### ► Scenario

M.G., a “frequent flier,” is admitted to the emergency department (ED) with a diagnosis of heart failure (HF). She was discharged from the hospital 10 days ago and comes in today stating, “I just had to come to the hospital today because I can’t catch my breath and my legs are as big as tree trunks.” After further questioning, you learn that she is strictly following the fluid and salt restriction ordered during her last hospital admission. She reports gaining 1 to 2 pounds every day since her discharge.

1. What error in teaching most likely occurred when M.G. was discharged 10 days ago?

*A breakdown of successful communication occurred regarding when to call with early weight gain. It is imperative that patients understand when to call their provider after being discharged from the hospital for exacerbated HF. Comprehensive patient education starting at admission is considered a standard of care and is mandated by The Joint Commission when care is provided to hospitalized patients. The goal of the discharge treatment plan is to facilitate successful patient self-management, minimize symptoms, and prevent readmission.*

### CASE STUDY PROGRESS

During the admission interview, the nurse makes a list of the medications M.G. took at home.

#### Chart View

#### Nursing Assessment: Medications Taken at Home

Enalapril (Vasotec)	5 mg PO bid
Pioglitazone (Actos)	45 mg PO every morning
Furosemide (Lasix)	40 mg/day PO
Potassium chloride	20 mEq/day PO

2. Which of these medications may have contributed to M.G.’s HF? Explain.

*Thiazolidinediones, such as pioglitazone, may increase the risk of HF and should not be used in patients with symptoms of HF. They commonly cause peripheral edema and weight gain (which are the result of both water retention and increased deposit of adipose tissue).*

## PART 1 MEDICAL-SURGICAL CASES

3. How do angiotensin-converting enzyme (ACE) inhibitors, such as enalapril (Vasotec), work to reduce HF? Select all that apply. ACE inhibitors:
- prevent the conversion of angiotensin I to angiotensin II.
  - cause systemic vasodilation.
  - promote the excretion of sodium and water in the renal tubules.
  - reduce preload and afterload.
  - increase cardiac contractility.
  - block sympathetic nervous system stimulation to the heart.

Answers: a, b, d

ACE inhibitors prevent the conversion of angiotensin I to angiotensin II, a potent vasoconstrictor. This results in systemic vasodilation, thereby reducing preload (reducing the volume of blood entering the left ventricle) and afterload (reducing the resistance to the left ventricular contraction) in patients with HF. ACE inhibitors do not promote the excretion of sodium and water, and they do not cause increased cardiac contractility or block the sympathetic nervous system to the heart.

## CASE STUDY PROGRESS

After reviewing M.G.'s medications, the physician writes the following medication orders.

## Chart View

## Medication Orders

Enalapril (Vasotec)	5 mg PO bid
Carvedilol (Coreg)	3.125 mg PO twice daily
Glipizide (Glucotrol)	10 mg PO every morning
Furosemide (Lasix)	80 mg intravenous push (IVP) now, then 40 mg/day IVP
Potassium chloride (K-Dur)	20 mEq/day PO

4. What is the rationale for changing the route of the furosemide (Lasix)?
- M.G. is fluid overloaded and needs to decrease fluid volume in a short period. Intravenous administration is delivered directly into the vascular system, where it can start to work immediately. In HF, blood flow to the entire gastrointestinal (GI) system is compromised; therefore the absorption of orally ingested medications may be variable and take longer to work.
5. You administer furosemide (Lasix) 80 mg IVP. Identify three parameters you would use to monitor the effectiveness of this medication.
- Increased urine output
  - Daily weight, looking for weight loss
  - Intake and output (I&O)
  - Decreased dependent edema
  - Decreased shortness of breath, diminished crackles in the bases of the lungs, decreased work of breathing, and decreased  $O_2$  demands
  - Decreased jugular venous distention (JVD)
6. What laboratory tests should be ordered for M.G. related to the order for furosemide (Lasix)? Select all that apply.
- Magnesium level
  - Sodium level
  - Complete blood count (CBC)

- d. Serum glucose level
- e. Potassium level
- f. Coagulation studies

Answers: a, b, d, e

Furosemide is a potent diuretic, especially when given via IVP, and may cause the loss of electrolytes such as magnesium, sodium, and potassium. These electrolytes will need to be supplemented if the levels are low. In addition, furosemide may increase serum glucose levels, which is an issue, considering that M.G. has diabetes. It is not necessary to monitor CBC or coagulation studies while the patient is on furosemide.

7. What is the purpose of the beta blocker carvedilol? It is given to:
- a. increase the contractility of the heart.
  - b. cause peripheral vasodilation.
  - c. increase urine output.
  - d. reduce cardiac stimulation from catecholamines.

Answer: d

Beta-blockers reduce or prevent stimulation of the heart from circulating catecholamines.



8. You assess M.G. for conditions that may be a contraindication to carvedilol. Which condition, if present, may cause serious problems if the patient takes this medication?
- a. Angina
  - b. Asthma
  - c. Glaucoma
  - d. Hypertension

Answer: b

Blocking of beta<sub>2</sub> receptors leads to a decrease in bronchial smooth muscle relaxation, or bronchoconstriction. Nonspecific (nonselective) beta-blocking drugs may precipitate bronchoconstriction and/or increased airway resistance. Therefore any preexisting respiratory condition such as asthma might be worsened by the concurrent use of any of these medications.

### CASE STUDY PROGRESS

One day later, M.G. has shown only slight improvement, and digoxin (Lanoxin) 125 mcg PO daily is added to her orders.

9. What is the action of the digoxin? Digoxin:
- a. causes systemic vasodilation.
  - b. promotes the excretion of sodium and water in the renal tubules.
  - c. increases cardiac contractility and cardiac output.
  - d. blocks sympathetic nervous system stimulation to the heart.

Answer: c

Digoxin works by increasing cardiac contractility and thus increasing cardiac output.

10. Which findings from M.G.'s assessment would indicate an increased possibility of digoxin toxicity? Explain your answer.
- a. Serum potassium level of 2.2 mEq/L
  - b. Serum sodium level of 139 mEq/L

## PART 1 MEDICAL-SURGICAL CASES

- c. Apical heart rate of 64 beats/minute
- d. Digoxin level 1.6 ng/mL

Answer: a

Low potassium levels can increase the potential for digoxin toxicity. M.G. is taking furosemide, a loop diuretic that excretes potassium as well as sodium and water. Potassium levels should be monitored carefully during digoxin therapy. The other findings are within normal limits.

11. When preparing to give the digoxin, you notice that it is available in milligrams (mg) not micrograms (mcg). Convert 125 mcg to mg.

$$125 \text{ mcg} = 0.125 \text{ mg}$$

If the student answers “.125 mg” the answer should be incorrect, because, per the Joint Commission “Do Not Use” list, the leading zero should not be omitted.

12. M.G.'s symptoms improve with intravenous diuretics and the digoxin. She is placed back on oral furosemide (Lasix) once her weight loss is deemed adequate for achievement of a euvolemic state. What will determine whether the oral dose will be adequate for discharge to be considered?

It is critical to provide the primary care provider with accurate, timely assessment data after the change from intravenous to oral diuretic therapy. One of the fluid management goals for patients with HF is to maintain a target weight. This is done by monitoring daily morning weight, keeping an accurate I&O, and recording subjective symptoms.

13. M.G. is ready for discharge. According to the mnemonic MAWDS, what key management concepts should be taught to prevent relapse and another admission?

The most essential aspect of teaching hospitalized patients is to focus on realistic key points.

Teaching should be aimed at successful communication of data to improve symptoms and prevent readmission, without overwhelming the learner. The five most essential concepts for patients with HF are included in MAWDS instructions.

*Medications:* Take as directed, do not skip a dose, and do not run out of medications.

*Activity:* Stay as active as you can while limiting your symptoms.

*Weight:* Weigh every morning. Call if you gain or lose 2 pounds overnight or are 5 pounds from your target weight.

*Diet:* Follow a low-salt diet, and limit fluids to less than 2 quarts or liters per day.

*Symptoms:* Know what symptoms to report to your provider; report early to prevent readmission.

14. After the teaching session, which statement by M.G. indicates a need for further education?

- a. “I will weigh myself daily and tell the doctor at my next visit if I am gaining weight.”
- b. “I will not add salt when I am cooking.”
- c. “I will try to take a short walk around the block with my husband three times a week.”
- d. “I will use a pill calendar box to remind me to take my medicine.”

Answer: a

If she notices a weight gain, she needs to notify her physician right away, not at the next office visit. This is what brought her back to the hospital in the first place!

## CASE STUDY OUTCOME

After 3 days, the STOP Heart Failure Nurse calls M.G. to ask about her progress. M.G. reports that her weight has not changed since she has been home.