

Cardiovascular Disorders

Case Study 1 Heart Failure

Difficulty: Beginning

Setting: Emergency department, hospital

Index Words: heart failure (HF), cardiomyopathy, volume overload, quality of life

► 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 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 providing care 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 heart failure? Explain.

Thiazolidinediones, such as pioglitazone, may increase the risk of heart failure and should not be used in patients with symptoms of heart failure. 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 heart failure? (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 these medication orders:

Chart View

Medication Orders

Enalapril (Vasotec) 5 mg PO bid
 Carvedilol (Coreg) 100 mg PO every morning
 Glipizide (Glucotrol) 10 mg PO every morning
 Furosemide (Lasix) 80 mg IV 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. IV 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 O₂ 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

- c. Complete blood count (CBC)
- d. Serum glucose levels
- e. Potassium level
- f. Coagulation studies

Answers: A, B, D, E

Furosemide is a potent diuretic, especially when given 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 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 by catecholamines

Answer: D

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

CASE STUDY PROGRESS

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

8. 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.

9. 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
 - 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.

10. When you go 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.

PART 1 MEDICAL-SURGICAL CASES

- 11.** M.G.'s symptoms improve with IV diuretics and the digoxin. She is placed back on oral furosemide (Lasix) once her weight loss is deemed adequate to achieve a euvolemic state. What will determine whether the oral dose will be adequate to consider her for discharge?

It is critical to provide the primary care provider with accurate, timely assessment data after the change from IV 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.

- 12.** M.G. is ready for discharge. Using 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 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.