

It is Friday morning (Time 0700), and you are working in an inpatient telemetry medical unit. You receive the following patient assignment from the off-going nurse.

Detail	Clinical Significance/Impact
<p>Situation: Jacob Jones is a 45-year-old male who was admitted for fluid volume overload with shortness of breath. His vital signs are: 165/80 mmHg, SpO2 88% on RA, RR 30, temp 98.6° F, HR 110 Sinus tach. He is being worked up for CHF exacerbation.</p> <p>Background: He has a PMH of CHF last recorded EF was 35-40%, diabetes mellitus type 2, and hypertension. He has no surgical history. His Chest Xray showed pulmonary infiltrates and bibasilar atelectasis. He was placed on 2L NC and is 95% SpO2.</p> <p>Assessment: Jacob is a full code status, with NKDA. He is being admitted for CHF exacerbation with fluid volume overload. He is placed on a continuous furosemide infusion. He is alert and oriented to person/place/time/situation. GCS 15. PERRLA. Mucous membranes are pink. Capillary refill <3 seconds. Apical HR tachycardic. Peripheral pulses palpable and weak x4 at +1. Edema +2 bLLE ankles and feet. No murmur. Lung sounds fine crackles in RLL, LLL. No stridor. Respirations are symmetrical and labored. Abdomen obese. Soft, non-tender. NABS x4. Last BM was yesterday. Negative for nausea and vomiting. Voids painlessly and without hesitation. Clear, yellow urine. UA Moves all extremities with no overt deficits. Ambulates unassisted but is slow paced. Equal grip strength bilaterally. Skin is warm, dry, and intact. No bruises or wounds noted. Broad affect, apprehensive. Wife at bedside for support. He has an 18 g in the right arm. Furosemide infusion administration at 10 mg/hr.</p> <p>Recommendation: Continue furosemide infusion. Strict intake and output. BMP scheduled to be drawn now. Cardiac monitor continuously. Sodium and fluid restriction.</p>	<ul style="list-style-type: none"> • Blood pressure is elevated. Possible cause is fluid volume excess. He also has a PMH of hypertension. The nurse should ask about home medications and if he is compliant. • Respirations are elevated due to fluid volume overload which causes extra fluid to enter your lungs reducing your ability to breathe normally. This is also confirmed with the CXR. • Sinus tachycardia may be due to increased metabolic demand, fluid volume overload, anxiety, or a baseline rhythm. • Ejection fraction of 35-40% is evidence of heart failure. A repeat echocardiogram can determine if this number is worse and if it is caused by systolic, diastolic, or both dysfunctions. • Oxygen should be placed on patients with an SpO2 of less than 88%. Above 94% is ideal for CHF exacerbations. • Assessment data confirms fluid volume overload (lung sounds, edema). • <i>Rationale:</i> The plan should be aggressive diuresis, cardiac monitoring, and electrolyte monitoring. Urine output often guides dosing of furosemide treatment. Electrolyte shifts can cause arrhythmias. Diuresis can cause electrolyte changes and should be monitored closely. Sodium and fluid restriction has been commonly recommended in patients with acute or chronic HF.

Furosemide infusion management: Test your knowledge	Clinical Significance/Impact
<ol style="list-style-type: none"> 1. What should you assess with the IV prior to administration? 2. What electrolyte(s) and other labs should be monitored during aggressive diuresis therapy? 3. Why should you monitor intake and output with diuresis? 4. Is there any special precautions with the IV tubing or setup needed prior to IV furosemide continuous infusion? 5. What are the guidelines for IV administration? 6. What are the pediatric considerations for administering furosemide? 7. What considerations does the nurse know to take into account when he/she is administering furosemide related to HEENT system? 	<ol style="list-style-type: none"> 1. Your IV should be patent and preferably proximal to the hand. 2. Furosemide is a loop diuretic therefore potassium should be closely monitored. BUN and serum creatinine often rise during diuretic treatment and should also be closely monitored. 3. FVO (fluid volume overload) is treated with diuretics. The type of diuretic used is dependent upon the urine output. This is why it is so important to closely monitor intake and output. 4. Furosemide is light sensitive and comes in a light protectant bag. Normal primary tubing and pump is used for administration. 5. In children, give 0.5 mg/kg/min, titrated to effect. Use infusion within 24 hours. 6. Ototoxicity is associated with rapid injection, severe renal impairment, use of higher than recommended doses, concomitant therapy with aminoglycoside antibiotics, ethacrynic acid, or other ototoxic drugs.
Case study continued	Clinical Significance/Impact
<p>The furosemide infusion has been administering for 4 hours. You have collected 2000 mL of urine and collected a BMP. The BMP results:</p> <ul style="list-style-type: none"> • BUN: 20 mg/dL • Cr: 1.2 mg/dL • Sodium: 135 mEq/L • Potassium: 4.0 mEq/L • Chloride: 100 mEq/L • Glucose: 250 mg/dL • CO2: 25 mEq/L 	<ul style="list-style-type: none"> • The urine output is significant. Continue to monitor. If the patient cannot use a urinal, place an indwelling catheter to accurately measure output. • BUN and Cr are on the high-normal range, continue to monitor. • Potassium is normal. • Glucose is elevated, request insulin coverage.
Next steps:	
<p>What do you expect the nurse to do next?</p>	<p>Request insulin coverage for hyperglycemia. It is usually treated above 150 mg/dL. Monitor BMP and verify that an order is placed for the next timed blood lab (in 2-4 hours).</p>

Case study continued	Clinical Significance/Impact
<p>The furosemide infusion has been administering for an additional 4 hours. You have collected 4000 mL of urine and collected a BMP. The BMP results:</p> <ul style="list-style-type: none"> • BUN: 25 mg/dL • Cr: 1.5 mg/dL • Sodium: 130 mEq/L • Potassium: 3.0 mEq/L • Chloride: 100 mEq/L • Glucose: 150 mg/dL • CO2: 25 mEq/L 	<ul style="list-style-type: none"> • The urine output is significant. Continue to monitor. If the patient cannot use a urinal, place an indwelling catheter to accurately measure output. • BUN and Cr are on trending higher. The nurse needs to monitor kidney function closely. Diuretics can cause kidney damage. • Potassium is low and needs to be replaced. • Glucose levels are lower and now stable.
Next steps:	Clinical Significance/Impact
<p>What do you expect the nurse to do next?</p>	<p>The patient has hypokalemia due to diuretic therapy. The nurse should request to replete the potassium. This is done by contacting the provider and obtaining a doctor's order. IV and PO potassium chloride can be given depending on how many mEq's are prescribed. Typically IV and PO will be given or IV Q2-4 until levels are therapeutic.</p>
IV Potassium chloride infusion management: Test your knowledge	What is the clinical significance or impact of each?
<ol style="list-style-type: none"> 1. What considerations does the nurse need to consider before administering IV potassium chloride? 2. Can you IV push potassium chloride? 3. What if the patient complains of "burning" at the IV site? 4. Can you Y-site normal saline while administering IV potassium Chloride. 	<ol style="list-style-type: none"> 1. Confirm IV is patent and assess the site. IV potassium chloride is compatible may be Y-site administered with furosemide as they are compatible. Double check with your pharmacist or provider. 2. No, you cannot quickly administer IV potassium off of a pump. This will cause deadly arrhythmias and will be lethal to the patient. 3. Potassium chloride often "burns" when being administered, especially in small vein. The nurse can attempt to slow down the IV KCL infusion. If that does not relieve pain, the nurse must re-site the IV catheter. 4. No, since the patient is fluid volume overloaded, you do not want to add more additional fluid with intake.

Case study continued	Clinical Significance/Impact
<p>The furosemide infusion is now completed. The patient's total fluid volume deficit is 10 liters. His vital signs are 90/50 mmHg, SpO2 98% on RA, RR 25, temp 98.6° F, HR 100. The follow up BMP after potassium chloride replacement is as follows:</p> <ul style="list-style-type: none">• BUN: 25 mg/dL• Cr: 1.2 mg/dL• Sodium: 131 mEq/L• Potassium: 3.8 mEq/L• Chloride: 100 mEq/L• Glucose: 145 mg/dL• CO2: 25 mEq/L	<ul style="list-style-type: none">• The patient's vital signs have stabilized. His blood pressure is lower than before; however, you should take into account how much fluid he has lost (10 liters).• Potassium level is normal• Serum creatinine has improved
Case study continued	Clinical Significance/Impact
<p>The provider orders a 1 Liter 0.9% sodium chloride bolus to be infused. Do you complete this order?</p>	<p>Before administered a fluid bolus for a CHF patient with a low EF, you need to clarify the order. If the patient is awake and alert, then a bolus is not needed. If the patient's LOC or mentation changes suggesting hypoperfusion, then a bolus may be needed but perhaps only 250 mL not 1000 mL.</p>

NursingCasesStudies.com

NCLEX-style bonus question

The nurse caring for a client diagnosed with fluid volume overload and is prescribed continuous IV furosemide infusion at 10 mg/hr. Which prescription by the health care provider would the nurse **question** as an anticipated interaction with furosemide?

Answer Choices

- A. 0.9% NaCl infusion at 250 mL/hr
- B. Potassium Chloride
- C. Spironolactone
- D. Metoprolol

Rational:

Correct Answer A: Furosemide usage for fluid volume overload means that the client should be on strict intake and output orders to measure how much volume has been removed. Adding a normal saline infusion will interact with furosemide in that it will keep adding fluid unnecessarily back into the vascular space. It is counterproductive.

Incorrect Answers:

Option B: Furosemide is a loop diuretic that inhibits reabsorption of sodium and chloride at proximal and distal tubule and in the loop of Henle. Potassium chloride is often prescribed with furosemide to replete potassium lost through the urine.

Option C: Spironolactone is a potassium sparing diuretic that competes with aldosterone at receptor sites in distal tubule, thereby resulting in the excretion of sodium chloride and water at the retention of potassium and phosphate. Spironolactone and furosemide are often used as conjunctive therapies.

Option D: Metoprolol is a beta blocker used to treat hypertension and heart failure and is often used in conjunction with furosemide.

Reference: Skidmore-Roth, L. (2020). *Mosbys 2020 nursing drug reference*. St. Louis, MO: Elsevier.

Educational Objective: Furosemide is a medication used to treat fluid volume overload. The nurse is responsible to monitor for anticipated interactions among the client's prescribed medications and fluids.

NCLEX topic: Illness Management

Category of client need: Adverse Effects/Contraindications/ Side Effects/ Interactions

NCLEX Review Question Reference

Hinkle, J.L., & Cheever, K.H. (2018). *Assessment and Management of Patients with Cardiac Disorders. Brunner & Suddarth's textbook of medical-surgical nursing (818)*. Philadelphia: Wolters Kluwer.

Skidmore-Roth, L. (2020). *Mosbys 2020 nursing drug reference*. St. Louis, MO: Elsevier.

Case Study References

Cleveland Clinic. (2020). Disease and Conditions. Pulmonary embolism: Who is at risk? Accessed on January 7, 2021 from <https://my.clevelandclinic.org/health/diseases/15802-pulmonary-embolism-who-is-at-risk>

Goldhaber, S., & Morrison, R. (2002). Pulmonary embolism and deep vein thrombosis. *Circulation*. AHA journals. Accessed on January 8, 2021 from <https://www.ahajournals.org/doi/full/10.1161/01.CIR.0000031167.64088.F6>

Hinkle, J.L., & Cheever, K.H. (2018). Management of patients with chest and lower respiratory tract disorders. *Brunner & Suddarth's textbook of medical-surgical nursing (616)*. Philadelphia: Wolters Kluwer.

Lasix (furosemide) dosing, indications, interactions, adverse effects, and more. (2020, February 20). Retrieved January 31, 2021, from <https://reference.medscape.com/drug/lasix-furosemide-342423#5>.

Lippincott Williams & Wilkins. (2012). Pulmonary Embolism. *The Washington Manual of Critical Care*. (97). Philadelphia: Wolters Kluwer.

Pagana, K.D (2020). *Mosby's diagnostic and laboratory test reference*. St. Louis: Elsevier Mosby.

NursingCaseStudies.com