CRITICAL THINKING **TEST YOUR CLINICAL SAVVY**

A 65-year-old non-insulin-dependent diabetes mellitus (NIDDM) client with a 10-year history of congestive heart failure is admitted to the intensive care unit with chest pain of more than 24 hours. The client is receiving heparin, insulin, calcium gluconate, and potassium chloride, all intravenously.

A. Why would an infusion pump be needed with these medications?

B. Why would medications that are based on body weight require the use of a pump? Why would medications based on BSA require an infusion pump?

C. Can any of these medications be regulated with standard roller clamp tubing? What would be the advantage? What would be the contraindication?

D. What other information would you need to calculate the drip rates of these medications?

E. Why would it be necessary to calculate how long each infusion will last?

PUTTING IT TOGETHER: CLINICAL CASE STUDIES

Mrs. R. is a 79-year-old woman with dyspnea without chest pain, fever, chills, or sweats. No evidence for bleeding. Admitted through the ER with BP 82/60 mm Hg, afebrile, sinus tachycardia at 110/minute. She underwent emergency dialysis and developed worsening dyspnea and was transferred to the ICU. BP on admission to ICU was 70/30 mm Hg, tachypneic at 44 breaths/minute, on 100% nonrebreather mask. No c/o chest discomfort or abdominal pain. Dyspnea worsened and the client became bradycardic and agonal respirations developed. A Code Blue was called and the client was resuscitated after intubation. Spontaneous pulse and atrial fibrillation was noted.

Past Medical History: cardiomegaly, severe cardiomyopathy, chronic atrial fibrillation, unstable angina, hypertension, chronic kidney disease with hemodialysis, TIA in 3/07.

Allergies: calcium channel blockers

Current Vital Signs: pulse 150/minute, blood pressure is 90/40 mm Hg, RR 18/minute via the ventilator. Afebrile. Weight: 90 kg

Medication Orders

piperacillin/tazobactam *antibiotic* 0.75 G IV in 50 mL q8h

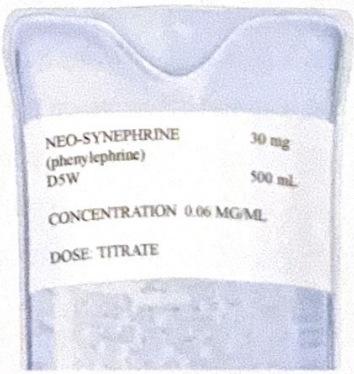
pantoprazole *antiulcer* 40 mg IV q12h. Dilute in 10 mL NS and give slow IV push.

phenylephrine *vasopressor* drip 30 mg in 500 mL D5W

100 mcg/minute titrate for SBP >90

norepinephrine *vasopressor* in 4 mg in 500 mL D5W

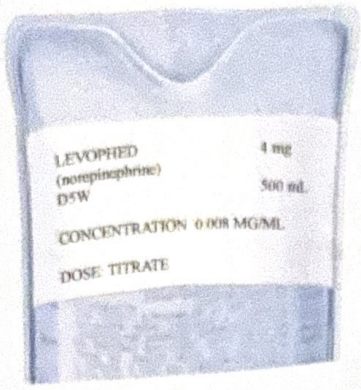
Titrate SBP >90 start at 0.5 mcg/minute



(continued)

1mg = 1000mcg

PUTTING IT TOGETHER: CLINICAL CASE STUDIES (continued)



$\frac{1}{2}$ NS 1000 mL at 150 mL/hour

Heparin *anticoagulant* 12 units/kg/hour. No loading dose. IV solution 25,000 units in 500 mL D5W.
Titrate to keep PTT 49–70.

Aspirin *antiplatelet* 81 mg po/N/G daily
digoxin *cardiac glycoside* 0.25 mg IV daily
propofol *sedative* 10 mg/mL
Titrate 5–50 mcg/kg/min for sedation

Calculations. Round the infusion rate to the nearest whole number.

1. Calculate how many micrograms per milliliter of phenylephrine. $\frac{30mg}{500mL} \cdot \frac{1000mcg}{1mg} = 60mcg/mL$
2. Calculate the rate on the infusion pump of phenylephrine 100 mcg/minute. $\frac{100mcg}{1min} = 100mL/hr$
3. Calculate how many micrograms per milliliter of norepinephrine. $\frac{4mg}{500mL} \cdot \frac{1000mcg}{1mg} = 8mcg/mL$
4. Calculate the rate on the infusion pump of norepinephrine 0.5 mcg/minute. $\frac{0.5mcg/min}{0.13mcg/min} = 4mL/hr$
5. Calculate the dose of heparin. $12units(90kg) = 1080units/hr$
6. Calculate the rate on the infusion pump of the heparin dose. When is the next PTT due? $\frac{1080units/hr}{25000units} \cdot 500mL = 22mL/hr$ → in 6 hours
7. Propofol is mixed in 100 mL. How many milligrams are mixed to equal 10 mg/mL? $100mL \cdot \frac{10mg}{1mL} = 1000mg$
8. Calculate the rate on the infusion pump of propofol—calculate using the range of 5 to 50 mcg/kg/minute. (Hint: calculate using 5 mcg/kg/minute and then recalculate using 50 mcg/kg/minute.)

$5mcg \cdot 90kg/hr = 450mcg/min$
$\frac{1000mg}{10mL} \rightarrow 10mg/mL\ (1000mcg) = \frac{10000mcg/mL}{60} \rightarrow 166.67mcg/min$
$\frac{450}{166.67}(1mL) = 3mL/hr$

$50mcg \cdot 90kg = 4500mcg/min$
$\frac{4500}{166.67}(1mL) = 27mL/hr$

PUTTING IT TOGETHER: CLINICAL CASE STUDIES (*continued*)

Critical Thinking Questions (use a drug handbook, the internet, or a mobile device drug app if needed)

1. Do any of the client's medical conditions warrant changes in the medication orders?
2. Why would two vasopressors be given together?
3. What is the reason for giving the client propofol?
4. What medication may help atrial fibrillation yet be contraindicated in this client?
5. What is a possible reason for the sinus tachycardia of 150/minute?
6. What is the reason for giving a drug slow IV push, such as the pantoprazole?

Answers in Appendix B.

1. She has chronic kidney disease, so her kidneys are not function properly to flitter out the medication. Plus, she is on dialysis which helps the kidneys to function. You may need to move some of the time of giving the medications so it does not interfer with her dialysis.
2. Because they have different reaction to raise her blood pressure. Her blood pressure was 82/60 and dropped to 70/30 in the ICU.
3. Propofol is used to sedate someone while they rest on a ventilator, like Mrs. R situation while she is on the ICU. Plus, being sedated will give her body to recover.
4. A calcium channel blocker to help, however, wont work because she has an allergy to calcium channel blockers.
5. Having 2 vasopressor medication could cause her heart rate to elevate. Plus, it was high when she was in the ER (110/min).
6. To be able to give the medication over a contuins time to help prevent side effects, like nausea or GI upset.