PRACTICE PROBLEMS—CHAPTER 17

6. Order: heparin 25,000 units in 250 mL 0.45% NS to infuse at 1,200 units/h

   Drop factor: On electronic infusion pump

   Flow rate: _____ mL/h

7. Order: thiamine 100 mg per L D$_5$W IV to infuse at 5 mg/h

   Drop factor: On electronic infusion pump

   Flow rate: _____ mL/h

8. Order: magnesium sulfate 4 g in 500 mL D$_5$W at 500 mg/h

   Drop factor: On electronic infusion pump

   Flow rate: _____ mL/h

9. A patient is to receive D$_5$W 500 mL c̄ heparin 20,000 units at 1,400 units/h.

   Set the infusion pump at _____ mL/h.

10. At the rate of 4 mL/min, how long will it take to administer 1.5 L of IV fluid?
    _____ h and _____ min

11. Order: lidocaine 2 g in 500 mL D$_5$W IV to run at 4 mg/min

    Drop factor: On electronic infusion pump calibrated in tenths of a mL/h

    Flow rate: _____ mL/h

12. Order: Xylocaine 1 g IV in 250 mL D$_5$W at 3 mg/min

    Drop factor: On electronic infusion pump calibrated in tenths of a mL/h

    Flow rate: _____ mL/h

13. Order: procainamide 1 g IV in 500 mL D$_5$W to infuse at 2 mg/min

    Drop factor: On electronic infusion pump calibrated in tenths of a mL/h

    Flow rate: _____ mL/h

14. Order: *dobutamine 250 mg IV in 250 mL D$_5$W to infuse at 5 mcg/kg/min*

    Weight: 80 kg

    Drop factor: On electronic infusion pump calibrated in tenths of a mL/h

    Flow rate: _____ mL/h

15. Your patient has an order for D$_5$W 1 L IV with 2 g lidocaine added infusing at 75 mL/h. The recommended continuous IV dosage of lidocaine is 1 to 4 mg/min. Is this dosage safe? _____

16. Orders: *Restricted fluids: 3,000 mL D$_5$NS IV for 24 h*

    Chloromycetin 1 g IV PB in 100 mL NS q.6h to run 1 h

    Drop factor: 10 gtt/mL

    Flow rate: _____ gtt/min IV PB and _____ gtt/min primary IV

17. Order: *Restricted fluids: 3,000 mL D$_5$W IV for 24 h*

    ampicillin 500 mg in 50 mL D$_5$W IV PB q.i.d. for 30 min

    Drop factor: On electronic infusion pump

    Flow rate: _____ mL/h IV PB and _____ mL/h primary IV

18. Order: *50 mg Nitropress IV in 500 mL D$_5$W to infuse at 3 mcg/kg/min*

    Weight: 125 lb

    Drop factor: On electronic infusion pump calibrated in tenths of a mL/h

    Flow rate: _____ mL/h

19. Order: *KCl 40 mEq to each liter IV fluid*

    Situation: IV discontinued with 800 mL remaining

    How much KCl infused? _____

20. A patient's infusion rate is 125 mL/h. The rate is equivalent to _____ mL/min.

21. Order: $\frac{1}{2}$NS 1,500 mL IV to run at 100 mL/h. Calculate the infusion time. _____ h

22. Order: *KCl 40 mEq/L D$_5$W IV to infuse at 2 mEq/h*

    Rate: _____ mL/h

23. Order: *heparin 50,000 units/L D$_5$W IV to infuse at 1,250 units/h*

    Rate: _____ mL/h

24. If the minimal dilution for tobramycin is 5 mg/mL and you are giving 37 mg, what is the least amount of fluid in which you could safely dilute the dosage? _____ mL

25. Order: *oxytocin 10 units IV in 500 mL NS. Infuse 4 milliunits/min for 20 min, followed by 6 milliunits/min for 20 min. Use electronic infusion pump.*

    Rate: _____ mL/h for first 20 min

    Rate: _____ mL/h for next 20 min

26. Order: magnesium sulfate 20 g IV in 500 mL of LR solution. Start with a bolus of 3 g to infuse over 30 min. Then maintain a continuous infusion at 2 g/h.

    You will use an electronic infusion pump.

    Rate: _____ mL/h for bolus

    Rate: _____ mL/h for continuous infusion

27. Order: Pitocin 15 units IV in 500 mL of LR solution. Infuse at 1 milliunit/min.

    You will use an electronic infusion pump.

    Rate: _____ mL/h

28. Order: heparin drip 40,000 units/L D₅W IV to infuse at 1,400 units/h

    Drop factor: On infusion pump

    Flow rate: _____ mL/h

Refer to this order for questions 29 and 30.

Order: magnesium sulfate 4 g IV in 500 mL D₅W at 500 mg/h on an infusion pump

29. What is the solution concentration? _____ mg/mL

30. What is the hourly flow rate? _____ mL/h

Calculate the drug concentration of the following IV solutions as requested.

31. A solution containing 80 units of oxytocin in 1,000 mL of D₅W: _____ milliunits/mL

32. A solution containing 200 mg of nitroglycerin in 500 mL of D₅W: _____ mg/mL

33. A solution containing 4 mg of Isuprel in 1,000 mL of D₅W: _____ mcg/mL

34. A solution containing 2 g of lidocaine in 500 mL of D₅W: _____ mg/mL .

Refer to this order for questions 35 through 37.

Order: venuronium bromide IV 1 mg/kg/min to control respirations for a patient who is ventilated

35. The patient weighs 220 pounds, which is equal to _____ kg.

36. The available venuronium bromide 20 mg is dissolved in 100 mL NS. This available solution concentration is _____ mg/mL, which is equivalent to _____ mcg/mL.

37. The IV is infusing at the rate of 1 mcg/kg/min on an infusion pump calibrated in tenths of a mL/h. The hourly rate is _____ mL/h.

Refer to these orders for questions 38 through 43.

Orders: Restricted fluids: 3,000 mL per 24 h. Primary IV of D₅LR running via infusion pump
          ampicillin 3 g IV PB q.6h in 100 mL of D₅W over 30 min
          gentamicin 170 mg IV PB q.8h in 50 mL of D₅W to infuse in 1 h

38. Calculate the IV PB flow rates. ampicillin: _____ mL/h; gentamicin: _____ mL/h

39. Calculate the total IV PB time. _____ h

40. Calculate the total IV PB volume. _____ mL

41. Calculate the total regular IV volume. _____ mL

42. Calculate the total regular IV time. _____ h

43. Calculate the regular IV flow rate. _____ mL/h

44. A patient who weighs 190 lb receives *dopamine 800 mg in 500 mL of D₅W IV at 4 mcg/kg/min.* As the patient's blood pressure drops, the nurse titrates the drip to 12 *mcg/kg/min* as ordered.

    What is the initial flow rate for the IV pump calibrated in tenths of a mL/h? _____ mL/h

    After titration, what is the flow rate? _____ mL/h

Questions 45 through 49 refer to your patient who has left-leg deep vein thrombosis. He has orde for IV heparin therapy. He weighs 225 lb. On admission, his aPTT is 25 seconds. You initiate theraj at 1130 on 5/10/xx. Follow the Standard Weight-Based Heparin Protocol (Figure 17-7), and record yo answers on the Standard Weight-Based Heparin Protocol Worksheet (Figure 17-8).

FIGURE 17-7

Standard Weight-Based Heparin Protocol

For all patients on heparin drips:
1. Weight in kilograms (round to nearest 10 kg). Required for order to be processed: _____ kg
2. Heparin 25,000 units in 250 mL of $\frac{1}{2}$NS. Boluses to be given as 1,000 units/mL.
3. aPTT q.6h or 6 hours after rate change; daily after two consecutive therapeutic aPTTs.
4. CBC initially and repeat every _____ days(s).
5. Obtain aPTT and PT/INR on day 1 prior to initiation of therapy.
6. Guaiac stool initially, then every _____ day(s) until heparin discontinued. Notify if positive.
7. Neuro checks every _____ hours while on heparin. Notify physician of any changes.
8. Discontinue aPTT and CBC once heparin drip is discontinued, unless otherwise ordered.
9. Notify physician of any bleeding problems.
10. Bolus with 80 units/kg. Start drip at 18 units/kg/h.
11. If aPTT is less than 35 secs: Rebolus with 80 units/kg and increase rate by 4 units/kg/h.
12. If aPTT is 36 to 44 secs: Rebolus with 40 units/kg and increase rate by 2 units/kg/h.
13. If aPTT is 45 to 75 secs: Continue current rate.
14. If aPTT is 76 to 90 secs: Decrease rate by 2 units/kg/h.
15. If aPTT is greater than 90 secs: Hold heparin for 1 hour and decrease rate by 3 units/kg/h.

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45. What is the patient's weight in kilograms? Calculate the weight as instructed in the protocol and record weight on the worksheet. _____ kg.

    What does the protocol indicate for the standard bolus dosage of heparin? _____ units/kg

46. Calculate the dosage of heparin that should be administered for the bolus for this patient, and record your answer on the worksheet. _____ units

    What does the protocol indicate as the required solution concentration (supply dosage) of heparin to use for the bolus? _____ units/mL

    Calculate the dose volume of heparin that should be administered for the bolus for this patient, and record your answer on the worksheet. _____ mL

FIGURE 17-6

STANDARD WEIGHT-BASED HEPARIN PROTOCOL WORKSHEET

Round patient's total body weight to nearest 10 kg: _____ kg.
DO NOT change the weight based on daily measurements.

FOUND ON THE ORDER FORM
Initial Bolus (80 units/kg): _____ units _____ mL
Initial Infusion Rate (18 units/kg/h): _____ units/h _____ mL/h

Make adjustments to the heparin drip rate as directed by the order form.
ALL DOSES ARE ROUNDED TO THE NEAREST 100 UNITS.

Date	Time	aPTT	Bolus	Rate Change units/h	mL/h	New Rate	RN 1	RN 2

If aPTT is	Then
Less than 35 secs:	Rebolus with 80 units/kg and increase rate by 4 units/kg/h.
36 to 44 secs:	Rebolus with 40 units/kg and increase rate by 2 units/kg/h.
45 to 75 secs:	Continue current rate.
76 to 90 secs:	Decrease rate by 2 units/kg/h.
Greater than 90 secs:	Hold heparin for 1 hour and decrease rate by 3 units/kg/h.

Signatures　　　　　　　　　　　　　　　　　　　　　　　　Initials

Step 2   IV PB time: q.6h = 4 times per 24h; 4 × 15 min = 60 min = 1 h

Step 3   IV PB volume: 4 × 50 mL = 200 mL

Step 4   Total regular IV volume: 3,000 mL − 200 mL = 2,800 mL

Step 5   Total regular IV time: 24 h − 1 h = 23 h

Step 6   Regular IV rate: $\frac{2,800\ mL}{23\ h}$ = 121.7 mL/h = 122 mL/h

Practice Problems—Chapter 17 from pages 543–548

1) 60 2) 5 3) 20 4) 50 5) 1 6) 12 7) 50 8) 63 9) 35 10) 6; 15 11) 60 12) 45 13) 60 14) 24 15) Yes 16) 17; 22
17) 100; 127 18) 102 19) 8 mEq 20) 2 21) 15 22) 50 23) 25 24) 7.4 25) 12; 18 26) 150; 50 27) 2 28) 35 29) 8
30) 63 31) 80 32) 0.4 33) 4 34) 4 35) 100 36) 0.2; 200 37) 30 38) 200; 50 39) 5 40) 550 41) 2,450 42) 19 43) 129
44) 13; 39 45) 100; 80 46) 8,000; 1,000; 8 47) 18; 1,800; 100; 18 48) 6; 40; 4,000; 4; increase; 2; 200; 2; 20
49) Decrease rate by 2 units/kg/h; 18

STANDARD WEIGHT-BASED HEPARIN PROTOCOL WORKSHEET

Round patient's total body weight to nearest 10 kg: _100_ kg.
DO NOT change the weight based on daily measurements.

FOUND ON THE ORDER FORM
Initial Bolus (80 units/kg): _8,000_ units _8_ mL
Initial Infusion Rate (18 units/kg/h): _1,800_ units/h _18_ mL/h

Make adjustments to the heparin drip rate as directed by the order form.
ALL DOSES ARE ROUNDED TO THE NEAREST 100 UNITS.

Date	Time	aPTT	Bolus	Rate Change Units/h	mL/h	New Rate	RN 1	RN 2
5/10/xx	1730	37 sec	4,000 units (4 mL)	+200 units/h	+2 mL/h	20 mL/h	G.P.	M.S.
5/10/xx	2330	77 sec		−200 units/h	−2 mL/h	18 mL/h	G.P.	M.S.

Signatures	Initials
G. Pickar, R.N.	G.P.
M. Smith, R.N.	M.S.

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50)   **Prevention:** The nurse who prepares any IV solution with an additive should *carefully* compare the order and medication three times: before beginning to prepare the dose, after the dosage is prepared, and just before it is administered to the patient. Further, the nurse should verify the safety of the dosage using the Three-Step Approach (convert, think, and calculate). It was clear that the nurse realized the error when a colleague questioned what was being prepared and the nurse verified the actual order. Also, taking the time to do the calculation on paper helps the nurse to "see" the answer and avoid a potentially life-threatening error. The precriber should also write out units and milliunits (U and mU are not permitted abbreviations). The nurse should contact the prescriber to clarify an order when unacceptable notation is used.