

## Drug Dosage: Reconstitutions, Intravenous, and Heparin Dosing

This handout contains practice problems related to reconstitution of medications, intravenous infusions, and heparin dosing to help prepare for drug dosage testing. For a list of common conversions and formulas, refer to the [Nursing Conversions and Formulas](#) handout. All drug label images in this handout were retrieved from the [NIH National Library of Medicine](#).

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### Reconstitutions

Round each answer to the nearest tenth as applicable.

1. A patient needs 25 mg of gentamicin I.M. The label says to add 1.3 mL sterile diluent to yield 50 mg/1.5 mL. How many milliliters of reconstituted solution should you give the patient?
2. The doctor orders 500 mg of ampicillin for a patient. A 1 g vial of powdered ampicillin is available. The label says to add 4.5 mL sterile water to yield 1 g/5 mL. How many milliliters of reconstituted ampicillin should you give?
3. A nurse is going to administer a patient's Pepcid. The order states that the patient is to receive 40 mg of Pepcid daily divided into four doses. A vial is supplied that states to mix powder with 60 mL of water to yield a solution with a concentration of 5 mg/mL. How many mL will the patient receive per dose?
4. Suppose a physician orders a patient's wound irrigated with 2/3 strength hydrogen peroxide and normal saline solution q.4h while awake. The nurse needs 60 mL per irrigation and will do 3 irrigations during her 12-hour shift. She will need to prepare 60 mL x 3 irrigations = 180 mL total solution. How much stock hydrogen peroxide and normal saline are needed?
5. A patient is to receive 250 mg of an antibiotic for an infection. The vial on hand states to mix the antibiotic powder with 25 mL of water and to administer IV push. The final concentration is 20 mg/mL. How many mL will the nurse be administering to the patient?

6. A doctor orders 500 mg of Cefdinir daily for a patient. Using the medication label below find the:
- Amount of diluent needed for reconstitution: \_\_\_\_\_
  - Total volume produced by reconstitution: \_\_\_\_\_
  - Daily dosage for the patient in mL: \_\_\_\_\_



- A doctor orders 1.5 grams of medication to be administered to a patient STAT. The medication is only available as a powder in a 4 gram vial that must be reconstituted with 400 cc of LR. How many mL will the nurse administer to the patient?
- 500 mL 50% betadine solution using normal saline. \_\_\_\_\_ mL stock betadine; \_\_\_\_\_ mL normal saline.
- A 3 gram vial must be reconstituted with 1000 cc of NS. What is the new concentration of the drug after reconstituting? (record in mg/mL).
- A nurse is preparing to administer a reconstituted medication to a patient and wants to verify with another nurse that she drew up the correct amount of mL. The original vial was 1.5 grams, and the diluent volume was 500 mL. The order was for the patient to receive 27 mg IV push over 2 minutes using a 10 cc syringe. The nurse drew up 10 mL.
  - Did the nurse draw up the correct amount?
  - If not, what is the correct dose in mL the patient should receive.

11. A patient is to receive 10 mg of gentamicin. The medication is available in a 2-gram vial. The order is for the powder to be reconstituted with 1000 cc of LR to equal a concentration of 2 grams/1000 mL. How many mL will the patient receive?
12. The order calls for 2,000 mcg of Vecuronium IV to be given b.i.d. Using the medication label below find the:
  - a. Amount of diluent required for reconstitution: \_\_\_\_\_
  - b. Daily dosage for patient in mL: \_\_\_\_\_

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|
| NDC 0703-2925-03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | Rx only |
| <b>Vecuronium</b><br><b>Bromide for Injection</b><br><b>20 mg*</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |         |
| *1 mg/mL when reconstituted to 20 mL<br>For IV Use Only<br>Sterile<br><b>10 x 20 mL Vials</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |         |
| When reconstituted with 20 mL of sterile water for injection, USP, the resultant solution will contain per mL: vecuronium bromide, 1 mg; citric acid anhydrous, USP, 2.075 mg; sodium phosphate dibasic anhydrous, USP, 1.625 mg; mannitol, USP, (to adjust tonicity) 9.7 mg. pH is adjusted with sodium hydroxide and/or phosphoric acid if necessary, pH: 3.5–4.5. When reconstituted with bacteriostatic water for injection, USP, <b>CONTAINS BENZYL ALCOHOL, WHICH IS NOT FOR USE IN NEWBORNS.</b> Use within 5 days. May be stored at room temperature or refrigerated. OR If reconstituted with sterile water for injection, USP, or other compatible IV solutions:<br>Refrigerate vial.<br>Use within 24 hours.<br>Single use only.<br>Discard unused portion. |  |         |
| <b>WARNING:</b> Vecuronium Bromide for Injection may cause respiratory depression. Facilities for artificial respiration must be immediately available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |         |
| <b>Usual Dosage:</b> See Package Insert.<br>Protect from light.<br>Store at 20° to 25°C (68° to 77°F)<br>[See USP Controlled Room Temperature].<br>Teva Parenteral Medicines, Inc., Irvine, CA 92618<br>Rev. A 10/2011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | Y10677  |

### IV Flow Rates

All infusion rates should be rounded to the nearest whole number.

1. You receive an order that reads KCl 40 mEq in 100 mL of NS over 40 minutes. You proceed to use a controller for the infusion, along with a microdrip tubing set. What is the drip rate in gtt/min?
2. A patient needs 15 mL of erythromycin, which is equal to 500 mg. The infusion is to be completed in 30 minutes using a tubing set calibrated to 20 gtt/mL. What is the drip rate in gtt/min?
3. A patient needs 250 mL of normal saline solution over 2 hours. What is the infusion rate in mL/hr?
4. If you plan to infuse 1 L of D5W at 50 mL/hour, what's the infusion time in hours?
5. Order: 3,500 mL D5LR IV to run at 160 mL/hr. Drop factor: 15 gtt/mL. What is the drip rate in gtt/min?

6. Order: 500 cc LR to infuse over 4 hours. What is the infusion rate (mL/hr)?
7. Order: 3,000 mL D5W IV @ 125 mL/h. Drop factor: 10 gtt/mL. What is the drip rate in gtt/min?
8. Order: Two 500 mL units of whole blood IV to be infused in 4 h. Infusion rate is calibrated to 20 drops per milliliter. What is the drip rate in gtt/min?
9. A patient requires 500 mL of normal saline solution at 80 mL/hour. What is the infusion time? If the normal saline solution is hung at 5am, what time will the infusion end?
10. Order: 500 mL D5W 0.45% Saline IV to infuse @ 165 mL/h Drop factor: 10 gtt/mL. What is the drip rate in gtt/min?
11. Order: 3 L NS IV to infuse @ 125 mL/h. Drop factor: 15 gtt/mL. What is the flow rate (gtt/min)?
12. Order: 1,000 cc NS IV @ 50 cc/h. Drop factor: 60 gtt/mL. What is the flow rate in gtt/min?
13. Order: 2,500 mL D5 0.45% NaCl IV @ 100 mL/h. Drop factor: 20 gtt/mL. What is the infusion time in hours?
14. Order 1,000 cc D5 0.45% NaCl to infuse over 8 hours. Drop factor: On electronic infusion pump. What is the flow rate (mL/hr)?
15. The doctor prescribes 250 mL of normal saline I.V. at 32 gtt/minute. The drip factor is 15 gtt/mL. What's the infusion time? Record answer as a number rounded to the nearest minute and as hours and minutes.
16. Order: 100 mL IV antibiotic to infuse in 30 min via electronic infusion pump. What is the flow rate (mL/hr)?
17. Order: 1,500 mL Lactated Ringer's IV for 12 hours @ 125 mL/h. Drop factor: 20 gtt/mL. What is the flow rate in gtt/min? After 6 hours, there are 850 mL remaining; describe your action at this time.
18. Order: 500 mL D5NS IV for 5 h @ 100 mL/h. Drop factor: 20 gtt/mL. What is the flow rate (gtt/min)? After 2 hours, there are 250 mL remaining, describe your action now.

19. Order: Ancef 1 g in 100 cc D5W IV PB to be infused over 45 min. Drop factor: 60 gtt/mL. What is the flow rate (gtt/min)?
20. Order: Add 225 mg of a medication to 250 mL of IV solution and administer 3 mcg/kg/min via infusion pump for a person who weighs 110 lb. Determine the flow rate (mL/hr).
21. Order: Lidocaine 2 g IV per 1,000 mL D5W at 4 mg/min. What is the flow rate (mL/hr)?
22. Pronestyl is administered at 2 mL/min for 2 hours. What is the total volume given to the patient?
23. Order: Isuprel 2 mg IV per 500 cc D5W at 5 mcg/min. What is the flow rate (mL/hr)?
24. Order: Dopamine 800 mg in 500 mL NS IV at 15 mcg/kg/min. Calculate the flow rate (mL/kg/hr). Round to the nearest hundredth.
25. Calculate the flow rate (gtt/min) for each of the following: Order: Give 1,000 mL of 0.45% NaCl IV for 480 minutes.
- a. Drop factor 10 gtt/mL \_\_\_\_\_
  - b. Drop factor 15 gtt/mL \_\_\_\_\_
  - c. Drop factor 20 gtt/mL \_\_\_\_\_
  - d. Drop factor 60 gtt/mL \_\_\_\_\_
26. Order: Ampicillin 500 mg dissolved in 200 mL D5W IV to run for 2 hours. Drop factor: 10 gtt/mL. What is the flow rate (gtt/min)?
27. Order: 1,000 mL D5W IV per 24 hr KVO. Drop factor: 60 gtt/mL. What is the drip rate (gtt/min)?
28. D5RL IV to run KVO for 24 hr at 20 gtt/min. The drop factor is 60 gtt/mL. What is the total volume administered?
29. Order: 2.5 L NS IV to infuse at 125 mL/hr. Drop factor is 20 gtt/mL. Calculate the flow rate (gtt/min).
30. Order: 1,000 mL D5W IV for 6 hr. Drop factor is 15 gtt/mL Calculate the flow rate in gtt/min. After 2 hours, 800 mL remain. Describe your action now.

31. Order: Infuse 1 gram of Aminophylline in 1000 mL of D5W at 0.7 mg/kg/hr. The client weighs 110 lb.
- Calculate the amount of drug in 1 mL (mg/mL) \_\_\_\_\_
  - Calculate the dosage to in mg/hr \_\_\_\_\_
  - Calculate the dosage in mg/min to one decimal place \_\_\_\_\_
  - The reference states no more than 20 mg/min. Is the order safe? \_\_\_\_\_
32. Order: Dobutamine 500 mg in 500 mL D5W to infuse at 30 mL/hr. The client weighs 140 lb.
- Calculate the amount of drug in 1mL (mg/mL) \_\_\_\_\_
  - Calculate the dosage in mg/hr \_\_\_\_\_
  - Calculate the dosage in mg/min \_\_\_\_\_
33. Order: Infuse 500 mL D5W with 800 mg Theophylline at 0.7 mg/kg/hr. The client weighs 73.5 kg. Calculate how many milligrams this client should receive per hour. Round to the nearest tenth.
34. A client is to receive Lidocaine 2 g in 250 mL D5W. The solution is infusing at 22 mL/hr. Calculate the following:
- Calculate the amount of drug in 1 mL \_\_\_\_\_
  - Calculate the dosage in mg/hr \_\_\_\_\_
  - Calculate the dosage in mg/min to one decimal place \_\_\_\_\_
35. Ringer's lactate 1000 mL is ordered to be given within 12 hours for a hyperthermic patient. The drop factor is 15 gtt/mL.
- \_\_\_\_\_ mL/hr
  - \_\_\_\_\_ gtt/min
36. A hypertensive patient has orders for Nipride 50 mg in 250 mL D5W. Infuse at 3 mcg/kg/min for a patient weighing 82 kg. The drop factor is 60 gtt/mL.
- Calculate the amount of drug in mcg/min for 82 kg patient \_\_\_\_\_
  - Calculate the amount of drug in mcg/mL \_\_\_\_\_
  - How many gtt/min? \_\_\_\_\_

37. The physician orders Nipride 50 mg in 500 mL D5W for a patient with hypertension. Infuse at 0.5 mcg/kg/min using microdrip for a patient weighing 75 kg.
- Calculate the amount of drug mcg/min for 75 kg patient to the tenths place \_\_\_\_\_
  - Calculate the amount of drug in mcg/mL \_\_\_\_\_
  - \_\_\_\_\_ gtt/min
38. A patient returns from cardiac catheterization. The physician orders 250 mL N.S. within 12 hours. The drop factor is 60 gtt/mL.
- \_\_\_\_\_ mL/hr
  - \_\_\_\_\_ gtt/min
39. A patient receives packed red blood cells 1 U (0.5L) for trauma and blood loss to infuse over 6 hours. The drop factor is 12 gtt/mL.
- \_\_\_\_\_ mL/hr
  - \_\_\_\_\_ gtt/min
40. The physician orders Dobutamine 250 mg in 250 mL D5W for a cardiogenic shock patient. Infuse at 10 mcg/kg/min using microdrip tubing for an 80 kg patient.
- Calculate the amount of drug in mcg/min for 80 kg patient \_\_\_\_\_
  - Calculate the amount of drug in mg/mL \_\_\_\_\_
  - \_\_\_\_\_ gtt/min
41. The physician orders Dextran 12% 1000 mL within 8 hours for a post-trauma victim. Drop factor is 12 gtt/mL.
- \_\_\_\_\_ mL/hr
  - \_\_\_\_\_ gtt/min
42. The doctor orders Cefazoline 20 mcg/kg/hr for a patient that weighs 154 lb. Available is Cefazoline 10 mg/mL. How many mL/day will the patient receive? Round the final answer to one decimal place.
43. The doctor orders Dobutamine 4 mcg/kg/min IV infusion for a patient weighing 198lb. Available is Dobutamine 250 mg/250 mL. How many mL/hr will you administer? Round to the tenths place.

44. A health care provider ordered Lactated Ringers 1 L to be infused at 125 mL/hr. The drop factor is 10 gtt/min. The nurse starts the infusion at 1400. The nurse returns to reassess the patient at 1700. How many mL of Lactated Ringers should the nurse record as the volume remaining in the bag?
45. A patient recovering from surgery is on continuous morphine infusion via a PCA pump. The doctor ordered an initial bolus dose of 2 mg of morphine, a basal rate set to 0.5mg/hr, and a demand dose of 0.5 mg/push. Morphine is available at 0.5mg/mL. The lockout time is every 30 minutes. The maximum daily safe dosage is 15 mg/day. If the patient presses the button 10 times over a 4-hour period, what is the maximum amount of morphine that the patient could have received in mL?

### **Heparin Calculations**

1. Order: Heparin IV to infuse at 1,000 U/hr. Is this dosage safe? Normal adult range is 20,000 to 40,000 U/24 hr.
2. Order: Heparin IV to infuse at 850 U/hr. Is this dosage safe? Use the same normal range as question 1.
3. Order: Heparin IV 2,000 U/hr. Is this dosage safe? Use the same normal range as question 1.
4. Order: 1,000 mL 0.45% NS with heparin 25,000 U to infuse at 1,000 U/hr. What is the flow rate? What is the daily heparin dosage (U/24hr)?
5. Order: 500 mL D5W IV with heparin 40,000 U to infuse at 1,100 U/hr. What is the flow rate?
6. Order: 500 mL 0.45% NS IV with heparin 25,000 U to infuse at 500 U/hr. What is the flow rate?
7. Order: D5W 1,000 mL IV with heparin 40,000 U to infuse at 40 mL/hr. What is the hourly heparin dosage?
8. Order: D5NS 500 mL with heparin 5,000 U added to infuse at 80 mL/hr. What is the hourly heparin dosage?
9. Order: D5W 1L IV with heparin 40,000 U to infuse at 30 mL/hr. What is the hourly heparin dosage?

**Answers**

**Reconstitutions**

1. 0.8 mL
2. 2.5 mL
3. 2 mL
4. 120 mL of hydrogen peroxide and 60 mL NS
5. 12.5 mL
6. a. 80 mL  
b. 100 mL  
c. 10 mL/day
7. 150 mL
8. 250 mL stock betadine; 250 mL NS
9. 3 mg/mL
10. a. No  
b. The patient should receive 9 mL
11. 5 mL
12. a. 20 mL  
b. 4 mL/day

**IV Flow Rates**

1. 150 gtt/min
2. 10 gtt/min
3. 125 mL/hr
4. 20 hours
5. 40 gtt/min
6. 125 mL/hr
7. 21 gtt/min
8. 83 gtt/min
9. Infusion time is 6 hrs 15 mins; infusion ends at 11:15 a.m. or 1115 hours
10. 28 gtt/min
11. 31 gtt/min
12. 50 gtt/min
13. 25 hours
14. 125 mL/hr
15. 117 mins or 1 hr 57 mins
16. 200 mL/hr
17. Flow rate is 42 gtt/min; increase to 47 gtt/min
18. Flow rate is 33 gtt/min; decrease to 28 gtt/min
19. 133 gtt/min
20. 10 mL/hr
21. 120 mL/hr
22. 240 mL
23. 75 mL/hr
24. 0.56 mL/kg/hr
25. a. 21 gtt/min  
b. 31 gtt/min  
c. 42 gtt/min  
d. 125 gtt/min
26. 17 gtt/min
27. 42 gtt/min
28. 480 mL
29. 42 gtt/min
30. Flow rate is 42 gtt/min; increase to 50 gtt/min
31. a. 1 mg/mL  
b. 35 mg/hr  
c. 0.6 mg/min  
d. Yes
32. a. 1 mg/mL  
b. 30 mg/hr  
c. 0.5 mg/min
33. 51.5 mg/hr

34. a. 8 mg/mL  
b. 176 mg/hr  
c. 2.9 mg/min

35. a. 83 mL/hr  
b. 21 gtt/min

36. a. 246 mcg/min  
b. 200 mcg/mL  
c. 74 gtt/min

37. a. 37.5 mcg/min  
b. 100 mcg/mL  
c. 23 gtt/min

38. a. 21 mL/hr  
b. 21 gtt/min

39. a. 83 mL/hr  
b. 17 gtt/min

40. a. 800 mcg/min  
b. 1 mg/mL  
c. 48 gtt/min

41. a. 125 mL/hr  
b. 25 gtt/min

42. 3.4 mL/day

43. 21.6 mL/hr

44. 625 mL remaining

45. 8 mL

#### **Heparin Calculations**

1. Yes
2. Yes
3. No
4. 40 mL/hr; 24,000 Units/day
5. 14 mL/hr

6. 10 mL/hr
7. 1,600 Units/hr
8. 800 Units/hr
9. 1,200 Units/hr