Dosage and Calculation

Module for Level 2: Medical-Surgical Nursing

**TABLE OF CONTENTS:**

<table>
<thead>
<tr>
<th>I.</th>
<th>Abbreviation</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.</td>
<td>Systems of Measurement</td>
<td>4</td>
</tr>
<tr>
<td>III.</td>
<td>Methods of Calculations: Dimensional Analysis</td>
<td>8</td>
</tr>
<tr>
<td>IV.</td>
<td>Reconstitution of Powdered Medications</td>
<td>14</td>
</tr>
<tr>
<td>V.</td>
<td>IV Calculations</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>a. Flowrates</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>i. mL/h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. gtts/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Infusion and Completion Time</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>c. Total Volume/Intake</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>d. Intermittent IV/Reconstitution</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>e. Special Medications</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>i. Hourly dosage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. Hourly rate (Flowrates)</td>
<td></td>
</tr>
<tr>
<td>VI.</td>
<td>Insulin per Sliding Scale</td>
<td>29</td>
</tr>
</tbody>
</table>
Module 1: Abbreviation

Objective:

Use abbreviations for the times and routes of drug administration as well as metric, apothecary and household abbreviations and abbreviations for drug preparation.

Abbreviations of times of medications:

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>MEANING</th>
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<tbody>
<tr>
<td>ac</td>
<td>Before meals</td>
</tr>
<tr>
<td>pc</td>
<td>After meals</td>
</tr>
<tr>
<td>Daily</td>
<td>Every day</td>
</tr>
<tr>
<td>bid</td>
<td>Twice a day</td>
</tr>
<tr>
<td>tid</td>
<td>Three times a day</td>
</tr>
<tr>
<td>qid</td>
<td>Four times a day</td>
</tr>
<tr>
<td>qh</td>
<td>Every hour</td>
</tr>
<tr>
<td>at bedtime</td>
<td>At hour of sleep</td>
</tr>
<tr>
<td>stat</td>
<td>Immediately</td>
</tr>
<tr>
<td>q2h</td>
<td>Every 2 hours</td>
</tr>
<tr>
<td>q3h</td>
<td>Every 3 hours</td>
</tr>
<tr>
<td>q4h</td>
<td>Every 4 hours</td>
</tr>
<tr>
<td>prn</td>
<td>If needed</td>
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Abbreviations for route of medications:

<table>
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<tr>
<th>ABBREVIATION</th>
<th>MEANING</th>
</tr>
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<tr>
<td>HHN</td>
<td>Hand-held nebulizer</td>
</tr>
<tr>
<td>IM</td>
<td>Intramuscularly</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenously</td>
</tr>
<tr>
<td>IVP</td>
<td>Intravenous Push</td>
</tr>
<tr>
<td>IVF</td>
<td>Intravenous Fluid</td>
</tr>
<tr>
<td>IVPB</td>
<td>Intravenous Piggyback</td>
</tr>
<tr>
<td>po (PO)</td>
<td>By mouth</td>
</tr>
<tr>
<td>PR (pr)</td>
<td>Per rectum</td>
</tr>
<tr>
<td>SL</td>
<td>Sublingual</td>
</tr>
<tr>
<td>Subcut</td>
<td>Subcutaneous</td>
</tr>
<tr>
<td>Top</td>
<td>Topical</td>
</tr>
<tr>
<td>od</td>
<td>Right eye</td>
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<tr>
<td>os</td>
<td>Left eye</td>
</tr>
<tr>
<td>ou</td>
<td>Both eyes</td>
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Exercises:
Directions: Explain what the statements mean in your own words.

1. Acetaminophen 120 mg po q4h PRN for Pain or for Temperature of above 102°F.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

2. Nitroglycerine 0.4 mg SL stat and may repeat every 5 minutes x 3 if chest pain continues.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

3. Lovenox 1mg/kg/body weight subcut q12h.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

4. Vasotec 5 mg IVP bid. Hold for systolic BP less than 100.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Module 2: Systems of Measurement

Units of Measures

- c = cup
- cm = centimeters
- ft = foot
- g = grams
- gr = grains
- gt = drop
- gtt = drops
- in = inches
- kg = kilograms
- L = liters
- lb = pound
- m = meters
- mcg = micrograms
- mEq = milliequivalents
- mg = milligrams
- mL = milliliters
- mm = millimeters
- oz = ounce
- pt = pint
- qt = quart
- Tbsp./T = tablespoons
- tsp./t = teaspoons

Equivalent

- 1 g = 1000 mg
- 1 mg = 1000 mcg or 0.001g
- 1 mcg = 0.000001 g
- 1 gr = 60 mg
- 1 t = 5 mL
- 1 T = 3 tsp./t or 15 mL
- 1 oz. = 30 mL
- 1 c = 8 oz. or 240 mL
- 1 L = 1000 mL
- 1 pt = 500 mL or 16 fl oz
- 1 kg = 2.2 lbs.
- 1 kg = 1000 g
- 1 in = 2.54 cm or 25.4 mm

Decimal Place Values

Whole numbers & decimal fractions

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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>.</th>
<th>5</th>
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Tenths = first decimal number
Hundredths = second decimal number
 Thousandths = third decimal number

*Fractions = reduce to the smallest term.
*Mixed number = combination of a whole number and a fraction.

*Write zero before a decimal point when the dose is less than a whole number. Example = 0.5 mL

*Do not use a decimal point or zero after a whole number. Example = 1.0 tab

*Conversions factor – refer to Booth 4e, Ch.6

*To convert: kg to lb = multiply (K L M)

To kg = divide

*Fahrenheit to Celsius:

\[
\frac{\circ F - 32}{1.8} = \circ C
\]

(big # to small # = minus then divide)

*Celsius to Fahrenheit:

\[
(1.8 \times \circ C) + 32 = \circ F
\]

(small # to big # = multiply and add)

Dosage and Calculation Module: Level 2 Medical-Surgical Nursing
Revised 11/12/2015
*Conventional Time to Military Time or
International Time/ 24 hr time;
Ex. 8:00 am = 0800
8:00 pm = 2000

Important Points:

1. Always place a zero before the decimal point when the quantity is less than a whole number.
   - **Example:** 0.5 is Correct
     .5 is WRONG
   - Never place a “0” at the end / No trailing zero.
     - **Example:** 1.5 is Correct
       1.50 is WRONG

2. Rounding Rules:
   - Rounding to whole number:
     **Example:** 1.8 = 2
     1.45 = 1
     1.1 = 1
   - Rounding to first decimal number:
     **Example:** 1.25 = 1.3
     0.27 = 0.3
     0.52 = 0.5
   - Rounding to second decimal number:
     **Example:** 3.5429 = 3.54
     0.666 = 0.67
     1.258 = 1.26
   - Rounding to third decimal number:
     **Example:** 3.5429 = 3.543
     1.7812 = 1.781
     0.6666 = 0.667

3. If medication is in mL, it is expressed in numbers.
   - **Example:** 1.5 mL is Correct
     1 ½ mL is WRONG
   - **OR**
     0.5 mL is CORRECT
     ½ mL is WRONG

Dosage and Calculation Module: Level 2 Medical-Surgical Nursing
Revised 11/12/2015
4. If medication is household measurements e.g. cups, Tsp, Tbsp, it is expressed in Fractions.
   Example: 1 ½ tsp is Correct
   1.5 tsp is WRONG

5. If tablet is NOT scored, the medication cannot be cut.

6. Capsules, EC, XL, LA, etc medications CANNOT be scored or crushed.
Exercises:
Direction: Fill in the blanks with the correct measurements:

1. 1.02 L = ___________________________ mL
2. 700 mL = ___________________________ L
3. 200 mcg = ___________________________ mg
4. 2 g = ___________________________ mg
5. 750 mg = ___________________________ mcg
6. 44 lbs = ___________________________ kg
7. gr X = ___________________________ mg
8. 500 mg = ___________________________ g
9. 3 T = ___________________________ mL
10. 1 t = ___________________________ mL
11. 8 ounces = ___________________________ mL
12. 1 cup = ___________________________ mL
13. 1 cup = ___________________________ ounces
14. 3 tsp = ___________________________ Tbsp
15. 80 k = ___________________________ lbs
MODULE 3: Methods of Calculations

A. Dimensional Analysis

EXERCISES:

EXAMPLE:
60 mg of medication XYZ are ordered. Tablets are available which have 30 mg of medication in each of them. How many tablets are needed to give 60 mg?

\[
\frac{60 \text{ mg}}{1} \times \frac{1 \text{ tab}}{30 \text{ mg}} = x \text{ tab}
\]

\[
\frac{60}{30} = 2 \text{ tabs}
\]

EXAMPLE 2:
Ordered: Potassium Chloride 15 mEq po qid. Pharmacy sent: 10 mEq/5mL. How many mL needed?

\[
\frac{15 \text{ meq}}{4} \times \frac{5 \text{ mL}}{10 \text{ meq}} = x \text{ mL}
\]

\[
= 7.5 \text{ mL}
\]

EXAMPLE 3:
Medication D 240 mg are ordered. Medication is available in 2 grains/1 tablet. How many tablets should be given?

\[
\frac{240 \text{ mg}}{1} \times \frac{1 \text{ tablet}}{2 \text{ grains}} \times \frac{1 \text{ grain}}{60 \text{ mg}} = x \text{ tablet}
\]

\[
\frac{240 \text{ tablet}}{120} = 2 \text{ tabs}
\]
EXAMPLE 4:
Order: Medication Y 25 mg/kg of body wt. IVP daily
Available: 5 g/20 mL
How many mL do you give to a 187 lb patient?

\[
\frac{25 \text{ mg}}{\text{kg}} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} \times 187 \text{ lbs} \times \frac{20 \text{ mL}}{5 \text{ g}} \times \frac{1 \text{ g}}{1000 \text{ mg}} = \frac{x \text{ mL}}{11000}
\]

\[
\frac{93500}{11000} = 8.5 \text{ mL}
\]
PRACTICE:

Instruction: Show computation.

1. Physician ordered: Ativan 1 mg IM q 4 hours PRN for anxiety.
   On hand:
   
   ![Ativan Injection Image]

   What is the dosage? ____________________________ mL

2. The physician orders Benadryl elixir 37.5 mg po for hives. How many tablespoon(s) will the nurse administer? ____________ T
3. The physician orders Zantac elixir 150 mg po twice a day for heartburn. The medication is supplied in 15 mg/mL. How many milliliters will the nurse administer? __________ mL

Shade the medicine cup to indicate the correct dosage.

4. The physician orders Dilantin oral suspension 80 mg po three times a day for seizures. The medication is supplied in 125 mg/5 mL. How many milliliters will the nurse administer? ______________ mL.
   Shade the syringe to indicate the correct dose.
5. According to the heparin protocol, a patient is to receive 70 units per kg IV before the continuous heparin infusion is started. For a patient weighing 80 lbs, how many units of heparin should be administered (Round to whole number)? ______________________ units
   Using a concentration of 1000 units/mL, how many milliliters of heparin should be administered (Round to first decimal number)? _______mL

6. The physician orders nitroglycerin tablets gr $\frac{1}{150}$ sublingual every 5 minutes up to three tablets for chest pain. The medication is supplied in 0.4-mg tablets. The patient took three tablets. How many milligrams did she receive in total? ____________mg

7. A patient with anemia has Epogen 7,500 units subcutaneous every Monday, Wednesday, and Friday. The Epogen is supplied in 10,000 units per 1 milliliter vials. How many milliliters would the nurse administer with each dose? (round to second decimal number) ___________mL
8. A patient has fentanyl 50 mcg IV every 2 hours prn for pain after surgery. The fentanyl is available in 0.05 mg per 1 milliliter vials. How many milliliters would the nurse administer with each dose? __________mL

9. A patient is weighing 110 lbs. is to receive a drug at the dosage of 250 mcg/kg/day in three divided doses. The medication is available in 5 mg/mL. How much are you going to administer per dose (round to first decimal number)?_________________________ mL

10. A 66 pound patient is to receive 0.4 meq/kg of a drug. The drug is available in 2 meq/4 mL. How many mL will be given? _______ mL

11. Phenobarbital grain ¾ po tid. the concentration of Phenobarbital Elixir is 20 mg/mL. How many mL should the nurse administer (round to the first decimal number)?_________________________ mL
Some medications are unstable when stored in liquid form, so they are packaged in powdered form. Before the medication can be administered, the powder must be diluted with liquid (This liquid is referred as diluent or solvent). Sometimes the package comes with a diluent or sometimes you use distilled water or normal saline. This process is referred to as “Reconstitution”. Oral suspensions will require a diluent of water.

EXAMPLE:

1. The physician orders Augmentin 500 mg po q12h. The pharmacy sends the following drug:

   a. How much of diluent will be added in the Augmentin powder? ________________________
   b. What kind of diluent will you use? ________________________________________________
   c. What is the dosage strength of the mixed medication? ______________________________
   d. What is the dose in mL? _______________________________________________________
   e. What is the dose in tsp? _______________________________________________________
2. The Physician orders cefazolin sodium 0.25 g IM q8h. The pharmacy sends:

   a. How much of diluent will be added in the Ancef powder? ________________________
   b. What kind of diluent will you use? ____________________________________________
   c. What is the dosage strength of the mixed medication? ____________________________
   d. What is the dose in mL? ____________________________________________________

3. Order: Cefoxitin 750 mg IV q 12 hours. On hand Cefoxitin 1 g IV. Package instruction: “Add 3.2 mL of Sterile water for final concentration of 300mg/mL. What is the dose? ___________________mL

4. Doctor’s Order: Cleocin Oral Suspension 600 mg po qid.
   Directions for mixing: Add 100 mL of water and shake vigorously.
   Each 2.5 mL will contain 100 mg of Cleocin. How many tsp of Cleocin will you administer?
   ______________________mL
5. Order: Biaxin 500 mg po q 12h. Supply: 80 mL bottle of reconstituted Biaxin to 50 mg/5 mL. How many mL is per dose? _____________________ mL

6. The physician orders Penicillin G 1 million units IV q 6h.

   a. What is the dosage strength if the nurse chooses to add 9.6 mL of diluent? ___________
   
   b. What is the dosage strength if the nurse chooses to add 4.6 mL diluent? ___________
   
   c. What is the dosage strength if the nurse chooses to add 1.6 mL diluent? ___________
   
   d. Calculate the dose for the different diluent:

      a) 9.6 mL diluent: __________ mL/dose
      
      b) 4.6 mL diluent: __________ mL/dose
      
      c) 1.6 mL diluent: __________ mL/dose
MODULE 5: IV Calculations

I. Infusion Rate or Flow Rate:
   - **Round IV to nearest whole number.**
   - Expressed in mL/hour if infusing via IV pump
   - Expressed in gtts/min if manually infusing
     - IV tubing play an important role in calculating
       - **Macrodrip**
         - Larger drops
         - Infusion Rate 80 mL/hr or more
         - Drop factors/Calibration factor of IV tubing:
           - 10 gtts/mL
           - 15 gtts/mL
           - 20 gtts/mL
       - **Microdrip**
         - Smaller drips
         - Infusion rates less than 80 mL/hr or KVO
         - Pediatric and Critical Care IV
         - Drop factor/Calibration factor of IV tubing:
           - 60 gtts/mL

II. Dimensional Analysis:
   a. Normal Saine 1 L to run over 10 hours. Drop factor: 15 gtts/mL. What is the Flowrate?
      a. \( \text{gtts/min} = \frac{15 \text{ gtts}}{\text{mL}} \times \frac{1000 \text{ mL}}{1 \text{ h}} \times \frac{1 \text{ h}}{60 \text{ min}} = 25 \text{ gtts/min} \)
      b. \( \text{mL/h} = \frac{1000 \text{ mL}}{10 \text{ h}} = 100 \text{ mL/h} \)
   b. Vancomycin 1 gram IVPB in 250 mL of NS to run over 90 minutes. Drop factor: 20 gtts/mL. What is the flowrate?
      a. \( \text{gtts/min} = \frac{20 \text{ gtts}}{\text{mL}} \times \frac{250 \text{ mL}}{90 \text{ min}} = 55.55 = 56 \text{ gtts/min} \)
      b. \( \text{mL/h} = \frac{250 \text{ mL}}{90 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ h}} = 166.66 = 167 \text{ mL/h} \)
c. IV order: 1000mL D5/W q8 hours. Set calibration is 15 gtts/mL.

1. \[
\text{gtts/min} = \frac{31 \text{ gtts/min}}{1000 \text{ mL} \times 1 \text{ hr} \times 15 \text{ gtts/hr} \times 60 \text{ min/hr} \times 1 \text{ mL}} = 31.25 = 31 \text{ gtts/min}
\]

2. \[
\text{mL/h} = \frac{125 \text{ mL/h}}{8 \text{ h}} = 15.625 \text{ mL/h}
\]
Practice: Flow rates

INSTRUCTIONS: Round flow rates to the nearest whole number.

1. Lactated Ringer’s 12,500 mL is to be infused in a burn patient over 8 hours. How many milliliters per hour should the IV fluids infuse? ________________ mL/h

2. The patient has D5W 1000 mL ordered over 10 hours. Using an IV pump, how many milliliters per hour should the IV fluids infuse? ___________ mL/h

3. An end-of-life patient has an order for fentanyl IV at 50 mcg/h. The fentanyl concentration is 10 mcg/mL. Using an IV controller, how many milliliters per hour should the fentanyl infuse? ___________ mL/h

4. A patient on a ventilator has an order for a continuous Ativan drip at 3 mg/h. The Ativan concentration is 0.2 mg/mL. Using an IV controller, how many milliliters per hour should the Ativan infuse? ___________ mL/h

5. A patient on a ventilator has an order for a continuous Versed drip at 4 mg/h. The Versed concentration is 50 mg/50 mL of NS. Using an IV controller, how many milliliters per hour should the Versed infuse? ___________ mL/h
6. The patient has vancomycin 1250 mg ordered once daily for an infection. The vancomycin is available in 250 mL of NS and should infuse over 2 hours. Using tubing with a 10 gtt/mL drip factor, how many drops per minute should the vancomycin be infused? ___________ gtt/min

7. 1000 mL of NS is ordered to infuse over 5 hours. Using an IV controller, how many milliliters per hour should the NS infuse? ________ mL/h

8. D5W 500 mL is to infuse over 6 hours. Using tubing with a 10 gtt/mL drip factor, how many drops per minute should the IV fluids be infused? ___________ gtt/min

9. D5W 1000 mL is to infuse over 10 hours. Using tubing with a 60 gtt/mL drip factor, how many drops per minute should the IV fluids be infused? ___________ gtts/min

10. The physician orders a Cardizem drip at 5 mg/h for Supraventricular Tachycardia. The Cardizem 100 mg is diluted in 100 mL of NS. Using an IV controller, how many milliliters per hour should the Cardizem infuse? ___________ mL/h
Infusion and Completion Time

If it is not specified in the order, you may have to calculate:

- duration - if fluid volume and flow rate are known;
- fluid volume - if the duration and flow rate are known.

A. Formula:
   To calculate infusion time in hours (T), identify the:
   \[ T = \frac{V}{F} \]
   \( V \) (volume)
   \( F \) (flow rate)

   Ordered: 1000 mL NS, infuse at 75 mL/h
   \[ \frac{1000 \text{ mL}}{75 \text{ mL/h}} \times 1 \text{ h} = 13.33 \]
   \[ 0.33 \times 60 = 19.8 = 20 \text{ minutes} \]
   Total time to infuse the solution = 13 hours and 20 minutes

   If the IVF was started at 10:00 AM, when will it finished? (Military Time)
   \[ 1000 + 1320 = 2320 \]

B. Dimensional Analysis:
   \[ \frac{1000 \text{ mL}}{75 \text{ mL/h}} \times 1 \text{ hr} = 13.33 \]
   \[ 0.33 \times 60 = 19.8 = 20 \text{ minutes} \]
   Total time to infuse the solution = 13 hours and 20 minutes

   If the IVF was started at 10:00 AM, when will it finished? (Military Time)
   \[ 1000 + 1320 = 2320 \]
Practice:

1. At 1200 the nurse hangs 500mL of D5W and regulates the flow rate at 40gtts/min. The set calibration is 20 gtts/mL.
   a. What is the infusion time? ____________  
   b. At what hour will the IV be completed? ____________ (Military Time)

2. An antibiotic solution of 50mL D5W is running at 100gtts/min. The set calibration is 60gtts/mL. What is the infusion time? ____________

3. IV order: 1L of D5/1/4NS q 10 hours. IV hung at 1000. Set calibration is 20 gtts/mL. When will the IV finish? ____________

4. The patient has an IVPB of Famotidine 20 mg in 100 mL NS. The nurse set the IV pump at 200 mL/h. What is the infusion time? __________________________

5. The nurse starts an IV of 100 mL D5W with 10 mEq KCl to infuse at 30 mL/hr. What is the infusion time? __________________________

6. The doctor ordered an IV bolus of 250 mL of NS over 45 minutes then followed with a maintenance IVF of NS at 125 mL/h. The nurse hung NS 1 L at 1:30 PM. What is the completion time (Military time) ________________ What is the infusion time? ________________

7. At 4 PM, 1 L D5W is started to infuse over 8 hours. At 7 PM, the IV gets infiltrated. The nurse restarted the IV at 9:00 PM at the same IV rate. Starting with the amount of IV fluid remaining at 9 PM, calculate the new infusion time and completion time of the IV.
   Completion Time: __________________________ Infusion Time: __________________________
Calculating Volume:

A. Dimensional Analysis:

Example: Find the total volume infused in 5 hours if the infusion rate is 35 mL/h.

\[
\frac{5 \text{ hours} \times 35 \text{ mL}}{1 \text{ h}} = 175 \text{ mL in 5 h}
\]

Practice

1. Ordered: D5NS at 65 mL/hr for 8 hours. Calculate the total IV Volume. ________________

2. A patient is receiving a maintenance IV at a rate of 125mL/hour. The doctor orders Mefoxin 3 G IV in 75mL D5W q6 hours. Calculate the 24 hour IV intake: ________________
Intermittent Infusion: Reconstitution

A. When preparing medication for an intermittent IV infusion:
   - Reconstitute the medication using the label and package insert (Refer to page 14 - Reconstitution Instructions)
   - Steps in Calculating: (3 Steps)
     - Calculate the amount to administer = Dose of Medication
     - Calculate the Total Volume
     - Calculate the flow rate

EXAMPLE:
Ordered: Eloxatin 75 mg in 250 mL D5W IV piggyback over 90 minutes
Instruction: Reconstitute with 20 mL of water for injection.
Dosage strength - 5mg/mL
Calculate the amount to administer and the flow rate.

1. Amount to administer:
   \[ D = 75 \text{ mg} \]
   \[ H = 5 \text{ mg/mL} \]
   \[ 75 \text{ mg} \times 1 \text{ mL} = 15 \text{ mL} \]
   \[ 5 \text{ mg} \]

2. Find the total Volume:
   \[ 15 \text{ mL} + 250 \text{ mL} = 265 \text{ mL} \]

3. Find the Flowrate:
   \[ 265 \text{ mL} \times 60 \text{ minutes} = 15900 \text{ mL} = 176.66666 = 177 \text{ mL/h} \]
   \[ 90 \text{ min} \times 1 \text{ h} = 90 \text{ h} \]
Practice

1. Order: Zithromax 250 mg IV in 250 mL of NS to run over 90 minutes daily.
   Available: Zithromax IV 1 Gram. Add 9.8 mL of Sterile Water for a final concentration 100 mg/mL.
   a. How many mL/dose? ____________________
   b. What is the flow rate (mL/h)? ________________

2. The doctor prescribes Methicillin 2 g in 250 mL IVPB over 90 minutes. Drop factor is 20 gtt/mL. Methicillin 1000 mg vials are available. Package instructions: Add 5 mL of Sterile Water diluent. Dosage strength of reconstituted vial is 200 mg/mL.
   a. How many vials will you use for this order? ________________
   b. How many milliliters is the dose? ________________________
   c. What is the flowrate (round to whole number)?
      a) gtt/min __________________
      b) mL/hr _____________________

3. Order: Penicillin G 300,000 Units in 100 mL NS to run over 1 hour.
   Available:
   a. How many mL of diluent will you use? ____________________
   b. What is the dosage? ____________________________ mL
   c. What is your flow rate? ____________________________mL/h

Dosage and Calculation Module: Level 2 Medical-Surgical Nursing
Revised 11/12/2015
Hourly Dosage and Hourly Rate of Medications:

Computing hourly rate of medication is the same as computing flow rates. (Refer to page 17)

1. Heparin 25,000 units/250 mL D5W. Order: Heparin 1450 units/hour on pump. What is the Flow rate ml/h?

\[
\frac{250 \text{ mL}}{25000 \text{ units}} \times 1450 \text{ units} = 14.5 = 15 \text{ mL/h}
\]

2. Order: Aminophylline 500 mg in 500 mL of D5W to infuse at 40 mL/hr.
What is the hourly dose? ____________ mg/hr

\[
\frac{500 \text{ mg}}{500 \text{ mL}} \times 40 \text{ mL} = 40 \text{ mg/h}
\]

3. IV order: 1000mL D5/1/2NS with 40 mEq of KCl to run for 10 hours. Set calibration is 60 gtts/mL. 
How many mEq of KCl/h will infuse? _________________ (mEq/h)

\[
\frac{40 \text{ mEq}}{10 \text{ h}} = 4 \text{ mEq/h}
\]
Practice:

1. An IV of 50 mg nitroglycerin in 250 mL D$_5$W is infusing at 3 mL/hr. What dose is the client receiving? ______________ mg/h

2. An IV of midazolam 5 mg in 100 mL D$_5$W is infusing at 20 mL/hr. What dose is the client receiving? ______________ mg/h

3. An IV of Cardizem 125 mg/125 mL D$_5$W is infusing at 12 mL/hr. What dose is the client receiving? ______________ mg/h

4. Order: Amiodarone 1 mg/min. Available: Amiodarone 450 mg in 250 mL NS
   The IV flow rate for this dosage is ______________ (mL/h).

5. Order: Fentanyl 50 mcg/hr IV drip. Available: Fentanyl 2.5 mg/250 mL NS
   The IV flow rate for this dosage is ______________ (mL/h).

6. Order: Heparin 1200 units/hr. Available: Heparin 50,000 units in 500 mL NS
   The IV flow rate is ______________ (mL/h).

7. Order: Heparin 1650 units/hr. Available: Heparin 25,000 units in 500 mL D$_5$W
   The IV flow rate is ______________ (mL/h).

8. Order: Regular insulin 7 units/hr IV. Available: Regular insulin 50 units in 250 mL NS
   The IV flow rate to deliver this dosage is ______________ (mL/h).

9. Order: Regular insulin 0.3 units/kg/hr IV. Available: Regular insulin 100 units in 100 mL NS
   Client’s weight: 220 lb. The IV flow rate to deliver this dosage is ______________ (mL/h).
10. Order: Aminophylline 0.4 mg/kg/hr. Patient's weight: 220 lb
The client is receiving a dosage of ______________ mg/h.

11. A patient in diabetic ketoacidosis has an order for an insulin drip at 10 units per hour. The pharmacy dilutes regular insulin 50 units in 100 mL of NS. How many milliliters per hour should the insulin drip be infused? _____________(mL/h).

12. A patient with deep vein thrombosis has an order for a heparin drip at 1000 units per hour. The pharmacy dilutes 25,000 units of heparin in 250 mL of NS. How many milliliters per hour should the heparin drip be infused? _____________(mL/h).

13. A patient with a pulmonary embolus has heparin drip infusing at 14 mL/h. The heparin concentration is 25,000 units in 250 mL of NS. How many units per hour is the patient receiving? ________________ units/h

14. The physician gives orders to infuse 1000 mL 0.9% NS at 200 mL/h for dehydration. Tubing drop factor is 10 gtt/mL. Calculate the flow rate in drops per minute. ____________________gtts/min

15. Order Levothyroxine 1 mcg/kg IV push. Available: Levothyroxine 0.050 mg/mL
Patient weight: 330 lbs. Administer: ________________________________ mL
Module 6: Insulin per Sliding Scale

- When Insulin is ordered per Sliding Scale, the dosing depends on the blood glucose reading. It can be given ac and at bedtime PRN or q4h PRN.

- Scheduled insulin can be given with the Sliding Scale.

- **NOTE:** Not all insulin can be mixed or given together. Please refer to Drug Handbook for Medication Compatibilities.

**EXAMPLE:**
Glucometer ac and bedtime. Give Regular Insulin subcutaneous per Sliding scale for the following blood sugar:

<table>
<thead>
<tr>
<th>Blood Sugar</th>
<th>Regular Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-180</td>
<td>0 units</td>
</tr>
<tr>
<td>181-200</td>
<td>2 units</td>
</tr>
<tr>
<td>201-220</td>
<td>4 units</td>
</tr>
<tr>
<td>221-240</td>
<td>6 units</td>
</tr>
<tr>
<td>&gt; 240</td>
<td>8 units and Call physician</td>
</tr>
</tbody>
</table>

1. Doctor’s order: Humulin NPH 17 units and Humulin regular 5 units Subcut ac breakfast and dinner. The AM blood sugar is 241 mg/dl. How much insulin should be given ac dinner? ___________ 30 ___________ unit(s)

\[
\text{NPH} = \text{Humulin Regular} + \text{5 units} \\
241 \text{ mg/dl Sliding scale glucose} = + \frac{8 \text{ units}}{30 \text{ units}}
\]

a. Put an arrow the amount to be given on the syringe.
Sliding Scale for Regular Insulin (For the next examples)

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<td>6 units</td>
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<tr>
<td>&gt; 240</td>
<td>8 units and Call physician</td>
</tr>
</tbody>
</table>


The AM blood sugar is 221 mg/dl.

How much total AM insulin should be given? ______23_________ unit(s)

**AM blood sugar = 221 mg/dl = 6 units = 17 units = 23 units**

3. Doctor’s order: Humulin N 15 units subcut q ac breakfast. Monitor glucose ac and at bedtime. Give Regular Insulin per sliding scale. Glucose before dinner is 185 mg/dL. Give: ____ 2 units _______ units

**Glucose = 185 mg/dL = 2 units**
Practice:

Sliding Scale for Regular Insulin (For the next Practice)

<table>
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<tr>
<td>&gt; 240</td>
<td>8 units and Call physician</td>
</tr>
</tbody>
</table>

1. Dr’s order: AM Insulin give Novolin N 10 units and PM insulin give Novolin N 8 units. Use Sliding scale ac and bedtime. PM glucose 220 mg/dL. How much PM Insulin are you going to give? ___________________________ units Shade the syringe the dose.

2. Dr’s order: AM Insulin give Novolin N 15 units and PM insulin give Novolin N 12 units. Use Sliding scale ac and bedtime. Bedtime glucose 189 mg/dL. How much bedtime Insulin are you going to give? ___________________________ units Shade the syringe the dose.
3. Dr’s order: AM Insulin give Novolin N 20 units and PM insulin give Novolin N 10 units. Use Sliding scale ac and bedtime. Before lunch glucose 180 mg/dL. How much insulin ac lunch Insulin are you going to give? ____________________________ units. Shade the syringe the dose.

4. Dr’s order: AM Insulin give Novolin N 25 units and PM insulin give Novolin N 15 units. Use Sliding scale ac and bedtime. AM glucose 251 mg/dL. How much AM Insulin are you going to give? ____________________________ units. Shade the syringe the dose.

5. Dr’s order: AM and PM insulin give Novolin N 18 units. Use Sliding scale ac and bedtime. PM glucose 181 mg/dL. How much PM Insulin are you going to give? ____________________________ units. Shade the syringe the dose.
Resources: