Math for Nurses

IV Calculations

N101 – Foundations of Nursing

2021

o IV Dosage Calculations:

- For intravenous (IV) dosage calculations, use the same rules learned for oral dosage calculations. Use:
  - Basic Formula
    - X = (Ordered/Available) x Quantity
  - Dimensional Analysis
    - $\frac{1 \text{ capsule}}{125 \text{ ~~mcg~~}} \times \frac{1000 \text{ ~~mcg~~}}{1 \text{ ~~mg~~}} \times \frac{0.5 \text{ ~~mg~~}}{x \text{ capsules}} = \frac{4 \text{ capsules}}{}$

o IV Therapy:

- Involves the administration of fluids, nutrients, electrolytes, medications, and blood products directly into a vein.
- IV therapy can be continuous or intermittent (IV infusion/IV piggyback/IV push).

o Key Terms:

- **Drip Rate:** the number of drops entering the drip chamber per minute.
  Based on the size of the IV tubing (gtt/min).
- **Drop Factor:** number of drops in 1 mL of solution.
  Based on the size of the IV tubing, given in gtt/mL.
  Range: 10 gtt/mL to 60 gtt/mL.
- **Flow Rate:** the rate in mL given over time (mL/hr)
- **Infusion Time:** the time in hours and minutes that it takes for an IV to completely infuse.

- **The Standard Formula: IV Flow Rate (mL/ hour)**
  - This formula is used to determine flow rate in milliliters per hour.
  - Usually will program pumps to run IV fluids or medications by entering mL/hr.
  - Examples:
    - Order: 1000 mL NS (normal saline) to infuse over 10 hours. How many mL/hr does the nurse program on the pump?
    - Order: 500 mL LR to infuse over 5 hours. How many mL/hr does the nurse program on the pump?

- **Infusion Time:**
  - The time in hours and minutes that it takes for an IV to completely infuse.
  - Examples:
    - How long will it take a 1,000 mL bag of NS running at 125 mL/hr to infuse?
    - How long will it take a 500 mL bag of 1/2 NS running at 60 mL/ hr to infuse?

- **Dimensional Analysis: Drip Rate (Drops per Minute)**
  - To calculate drip rate in drops per minute (gtt/min) you will need:
    - The *total volume* to be infused in mL.
    - The *drop factor* in gtt/mL of the tubing you will be using. (Located on IV tubing package, or specified on worksheet) = usually 10 gtt/mL
    - The *total time* the infusion will run in hours or minutes.
  - **Formula:**

$$\frac{\text{Total volume mL}}{\text{Total time hr}} \times \frac{\text{gtt}}{\text{mL}} \times \frac{1\text{ hr}}{60\text{ min}} = \frac{\text{gtt}}{\text{min}}$$

(drop factor) (conversion factor)

  - **Examples:**
    - Order: Avelox 500 mL to infuse over 1 hour. The drop factor is 10 gtt/mL. What is the drip rate in gtt/min?

    - Order: Infuse 1,000 mL of LR over 8 hours. The drop factor is 10 gtt/mL. What is the drip rate?

- Order: Infuse 1000 mL NS at 125 mL/hr. The drop factor is 20 gtt/mL. What is the drip rate?

- Order: Infuse 1000 mL NS with 40 mEq KCl at 125 mL/hr. How many mEq/hr of KCl will be in infused?