

# Medication calculations

There are 4 basic steps to solving proportion problems:

- 1) Set up a known ratio.
- 2) Set up a proportion with known and desired units. Use x for the quantity that is desired or unknown.
- 3) Cross multiply.
- 4) Solve for x.

Example:

Dose Ordered: Medication B 15 mEq po every day.

Available: Medication B 10 mEq/5ml.

How many ml's will you give?

a) Set up proportion. (Units are matched therefore no need to convert- mEq to mEq and ml to ml)

b) Cross multiply and solve for x.

$$\frac{10\text{mEq}}{5\text{ml}} = \frac{15\text{mEq}}{X\text{ml}}$$

$$10x=75 \quad x=\frac{75}{10} \quad 15 \text{ mEq}= 7.5 \text{ ml}$$

(Solve for X to determine the number of tablets, milligrams, milliliters, etc., you will administer to the patient by cross- multiplying)

## Calculating IV Flow Rates:

To find hourly rate (stated in mls per hour)

$$\frac{\text{Total volume of solution in ml's}}{\text{Total amount of time in hours}} = x \text{ ml's}$$

Example: 1000 cc IV solution ordered to infuse over 8 hours.

$$\underline{1000 \text{ ml}} = 125$$

8 hrs.

Answer: 125 ml/hour

Example: 1000 ml solution to infuse over 6 hours.

$$\frac{1000 \text{ ml}}{6 \text{ hrs.}} = 166.6 = 167$$

Answer: 167 ml or ml/hr

(Remember: when answer does not come out evenly, round off to the nearest whole number. If 5 & greater round up, below 5, round down.)

### To find flow rate stated in drops per minute:

Drop factor is the number of drops it takes to equal 1 ml with a specific type of IV tubing. The drop factor is stated on the tubing package.

$$\frac{\text{ml/hr.} \times \text{drop factor}}{\text{total amount of time in minutes}} = \text{gtts/min}$$

Example: IV order D51/2 NS at 120 ml/hr

The drop factor is a 15 gtts/ml and the flow rate is 120 ml/hr.

$$\frac{120 \text{ ml/hr} \times 15 \text{ gtts/ml}}{60 \text{ mins/hr}} = \frac{1800}{60} = 30 \text{ gtts/min}$$

### IV drip calculations

Order is written as mg/hr.

Example:

Order: Fentanyl 5 mg/hr. The bag is labeled 250 mg in 500 ml of solution.  
How fast will the IV need to be infused to give the correct dose?

1. The IV rate will be as an hourly rate, so no conversion needs to be made for time. If the order was written with a different time, you would need to calculate the mg/hr. (use ratio and proportion)
2. Put the problem in ratio and proportion.

$$\frac{5 \text{ mg}}{x \text{ ml}} = \frac{250 \text{ mg}}{500 \text{ ml}} \quad 5(500) = 250 \times \frac{2500}{250} \quad x = 10 \text{ ml/hr IV rate}$$

### C. When the order is written as unit of mcg/kg/min.

Example: Dopamine order: 5 mcg/kg/min. Bag is labeled: Dopamine 400 mg in 250ml NS. Pt weight= 63 kg.

Dose ordered x weight (if weight based) x volume x time

Have (dose of drug you have; must match units in dose ordered)

\*\* Remember that pumps deliver ml/hr, so drips that deliver per minute need to have time conversion factored in (60 min/1 hr); those drips that are delivered per hour do not need this time conversion

1. Desired (dose ordered) = 5 mcg/kg/min x (pt weight) 63 kg
2. Have = 400 mg Dopamine; must convert to mcg by multiplying by 1000
3. Volume = 250 ml (volume in IV bag)
4. Also include time conversion of 60 min/hr

$$\frac{5 \text{ mcg/kg/min} \times 63 \text{ kg} \times 250 \text{ ml} \times 60 \text{ min/hr}}{400,000 \text{ mcg} \quad (400 \text{ mg} \times 1000 \text{ mcg/1 mg})} = \frac{4725000}{400,000}$$

Answer: 11.8 ml/hr---this is what the pump must be set at (-round up to 12ml/hr)

Order: Dopamine 20 mcg/Kg/minute. The bag is labeled Dopamine 100 mg/50 ml. The patient weighs 88 lbs. How fast will the IV run to give the dose?

1. Must convert pounds to kg  $88 \div 2.2 = 40\text{kg}$

Dose ordered x weight (if weight based) x volume x time

Have (dose of drug you have; must match units in dose ordered)

$$\frac{20 \text{ mcg/kg/min} \times 40 \text{ kg} \times 50 \text{ ml} \times 60 \text{ min}}{100,000 \text{ mcg/ml}} = \frac{2400000}{100,000} = 24 \text{ ml /hr}$$