VOLUME TO GIVE

All injectables need to be in liquid form as we cannot administer a solid tablet into veins or muscle tissue.

Oral medication can sometimes be calculated as a volume if it comes in suspension, syrup or soluble powder form.

Liquid formulations are more appropriate for those with swallowing problems, or when giving medicaiton via PEG or NG route.

FORMULA

$$\frac{\text{what you want}}{\text{what you have got}} \times \text{volume it is in}$$

What you want is what is prescribed for your patient.

What you have got is what is in stock to give to your patient.

The volume it is in is how many mls that dose is available in.

You need to ensure that the units are the same for what you want and what you have got - if not, convert the units to what you have got in stock.

EXAMPLE

You need to give your patient 8mg of Drug C. Drug C is available as 10mg/2ml. How many mls will you give to your patient?

What you want = 8mg

What you have got = 10mg

Volume it is in = 2mls

$$\frac{8}{10} \times 2 = 1.6\text{mls}$$

Check that your answer makes sense clinically and have a colleague double check your calculation.

FLOW RATES

Many patients require IV infusions and so it is important to know how to give these correctly.

The advantage of giving medication, hydration or electrolytes IV is it is quick and effective, has an immediate effect and has 100% bioavailability as it bypasses the GI tract.

FORMULA

$$\frac{\text{volume in mls}}{\text{time in hours}} = \text{infusion rate in mls/hr}$$

The infusion rate is basically the volume of a solution or drug that is administered over a given amount of time and is calculated in millilitres per hour (mls/hr)

Check that your answer makes sense clinically and have a colleague double check your calculation.

EXAMPLE

Your patient needs to be given 1000mls of IV solution over 8 hours. How many mls/hr will you need to give?

Volume in mls = 1000mls

Time in hours = 8 hours

$$\frac{1000}{8} = 125\text{ml/hr}$$

EXAMPLE

Your patient needs to be given 100mls of IV solution over 30 minutes. How many mls/hr will you need to give?

Volume in mls = 1000mls

Time in hours = 30 minutes = 0.5 hours

To convert minutes to hours we need to divide the number of minutes by 60 because there are 60 minutes in an hour.

30 minutes / 60 = 0.5 hours

$$\frac{100}{0.5} = 200\text{ml/hr}$$

DROP RATES

Allows exact quantities of solution or medication to be given in an amount of time when mechanical pumps may not be available for whatever reason.

The drop factor tells us how many drops of IV solution equal 1ml.

The different sized tubing comes pre-calibrated to give exact drop factors and this information can be found printed on the packaging like the expiry date.

When infusions are given in drops/minute, the drops going into the chamber of IV solution need to be counted for a minute and the speed of infusion adjusted until the desired number of drops per minute is seen dropping into the chamber.

FORMULA

$$\frac{\text{drop factor} \times \text{volume in mls}}{\text{time in minutes}} = \text{drops per minute}$$

Check that your answer makes sense clinically and have a colleague double check your calculation.

This formula can be remembered with the acronym DVT where D is drop factor, V is volume in mls, and T is time in minutes.

EXAMPLE

Your patient needs to be given 100mls of IV solution over 8 hours using a giving set with a drop factor of 20. How many drops per minute will you need to give to the nearest whole number?

Drop factor = 20

Volume in mls = 1000mls

Time in minutes = 8 hours = 480 minutes

To convert hours to minutes we need to multiply the number of hours by 60 because there are 60 minutes in an hour. 8 hours x 60 minutes = 480 minutes

$$\frac{20 \times 1000}{480} = 41.6666667 = 42 \text{ drops per minute}$$

TABLETS/CAPSULES

The most common method of giving medication to patients.

Check that your answer makes sense clinically.

Have a colleague double check your calculation.

FORMULA

$$\frac{\text{what you want}}{\text{what you have got}} = \text{number of tablets}$$

What you want is what is prescribed for your patient.

What you have got is what is in stock to give to your patient.

You need to ensure that the units are the same for what you want and what you have got - if not, convert the units to what you have got in stock.

EXAMPLE

You need to give your patient 50mg of Drug A and it is availalbe as 12.5mg tablets. How many tablets will you give to your patient?

What you want = 50mg

What you have got = 12.5mg

$$\frac{50}{12.5} = 4 \text{ tablets}$$

WEIGHT BASED DOSES

Some medications need to be titrated according to a patients weight, or their weight needs to be considered before we can decide how much of a drug they need.

A prescription may state, for example, that a patient needs 3mg/kg of a drug, or that for patients weighing below 45kg a reduced dose must be given.

Check that your answer makes sense clinically and have a colleague double check your calculation.

FORMULA

Dose = weight in kg x dose per kg

EXAMPLE

A prescription states a patient needs a total dose of 30mg/kg of Drug B to be given in 3 equal doses during a 24 hour period. The patient weighs 48kg.

Dose = weight in kg x dose per kg   Dose = 48kg x 30mg/kg   Dose = 1440mg total daily dose

Daily dose needs to be given in 3 equal doses.   Daily dose / 3   =   1440mg / 3 = 480mg per dose
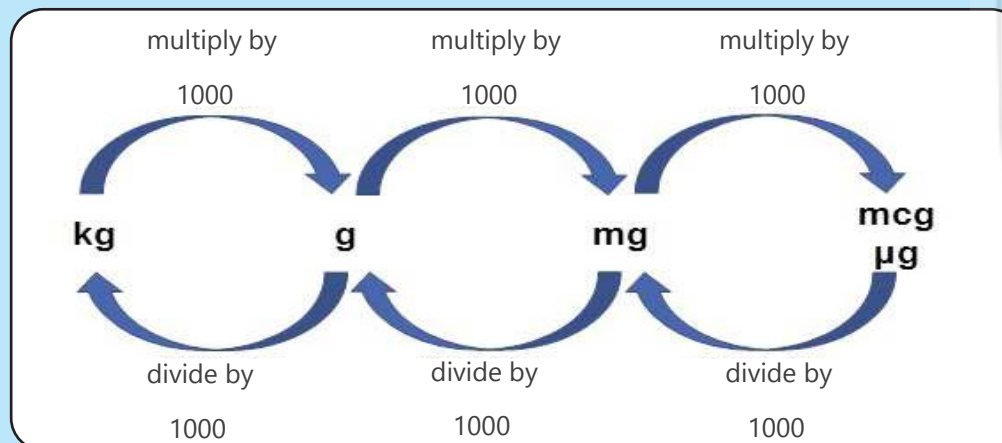
UNIT CONVERSIONS

Prior to performing any drug calculation, it is important that all values are in the same unit, which may require a conversion calculation.

To convert a large unit into a smaller unit, multiply the large unit by 1000 to end up with a larger number.

To convert a smaller unit into a larger unit, divide the smaller unit by 1000 to end up with a smaller number.

Always check does it look right once you have done the calculation.

FORMULA

multiply by 1000   multiply by 1000   multiply by 1000

kg   g   mg   mcg / µg

divide by 1000   divide by 1000   divide by 1000

EXAMPLES

kg to g = kg x 1000

g to mg = g x 1000

mg to micrograms = mg x 1000

g to kg = mg / 1000

mg to g = mg / 1000

micrograms to mg = micrograms / 1000