

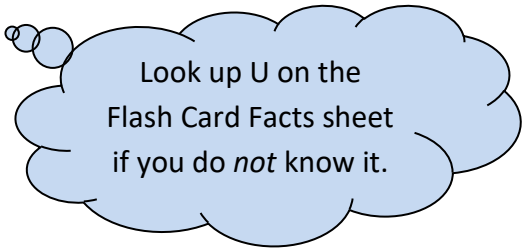
Technical Math for Allied Health
Class notes
Parenteral Medication Administration Including Flow Rates (Module 9)

Recall that parenteral medications are those that bypass the gastrointestinal tract. Recall that that includes **intravenous** (abbreviation **IV**), **intramuscular** (abbreviation **IM**), or **subcutaneous** (abbreviation **SC**) injections. These, respectively, mean injections into the vein, the muscle, or the fatty tissue under the skin.

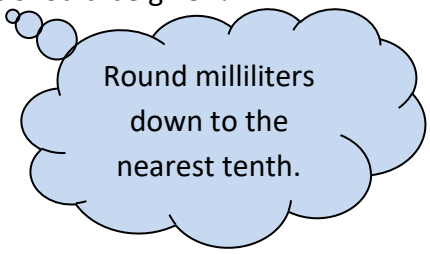
In Part 1 of these notes, we will cover IM and SC injections. In Part 2, we'll introduce and define lots of stuff needed for IV injections. In Part 3, we'll practice finding the flow rate of IV injections (defined in Part 2). We further explore IV administrations in module 10.

Part 1: Intramuscular (**IM**) **and Subcutaneous** (**SC**) **Injections:**
We will use dimensional (or unit) analysis to help solve these problems. You will always want to start at the patient's order and use whatever ratios you need to end up with the proper units.

example 1: A patient order reads 750,000 U IM. A disposable prepackaged syringe contains 2 milliliters and the label says that it contains 1,200,000 U. How many milliliters should the patient receive?



example 2: A doctor orders that a patient is to receive 35 mg SC of codeine phosphate. The label indicates "50 mg/mL". What does SC mean? How many milliliters should be given?



Part 2: Introduction to Intravenous (IV) Administration:

An IV, used for fluid hydration or medication, is more complicated. Equipment will vary and we need to take care of additional calculations. Here is some basic vocabulary.

Definition: Flow rate: This is the rate that the IV fluid enters the vein, given in a specific period of time. The units are *usually* given in drops per minute (gtt/min).

An example would be 15 gtt/min. This will vary.

Round flow rates to the nearest whole drop per minute.

Definition: Infusion time: This is the amount of total time that it will take for the prescribed amount of fluids to be delivered. The units will typically be minutes or hours.

Definition: Infusion volume: This is the total amount of fluid to be administered. The units are typically pints (as with blood) or milliliters (as with medication).

Definition: Calibration drop factor: This is the amount of flow allowed by the tubing used. There are two main sizes of drop factors in infusion sets, **macrodrop** and **microdrop** (also called **minidrop**). **Macrodrop** sets deliver between 10 gtt/mL and 20 gtt/mL, depending on the manufacturer. **Microdrop** sets deliver 60 gtt/mL.

Flash Card Fact Number 23 says that 15 gtt = 1 mL. That is given as a general conversion *but will not be used in modules 9 and 10*.

Important Abbreviations:

As always, we will be interpreting many abbreviations. Here are a few specific to these problems.

D: dextrose
W: water
S: saline
NS: normal saline (0.9% NaCl)
RL or LR: Lactated Ringer's

My AI overlord tells me that Lactated Ringer's is "an isotonic intravenous (IV) crystalloid solution used to replace water, electrolytes, and help balance the pH of blood."

Examples: D5W: 5% dextrose in water
D5 ¼ NS: 5% dextrose in 0.225% saline solution

This font makes it hard to distinguish a 5 from an S. Be you careful.

We will work on calculating flow rates, total infusion times, and infusion volumes. Module 9 focuses on flow rates while Module 10 will cover infusion times and volumes. Again, unit analysis will be key to keeping it all straight.

Part 3: Calculating Flow Rates for Intravenous (IV) Administration:
Always start with the doctor's order. Use the given (calibration) drop factor. We may need to convert from minutes to hours or vice versa.

Always round to the nearest whole drop per minute.

example 3: A patient needs an infusion of 250 mL with a total infusion time of 150 minutes. Calculate the flow rate (in drops per minute) if the infusion set has a calibration drop factor of 15 gtt/mL.

example 4: An infusion of 2,000 mL of D5W is to be administered over an eight-hour period. The infusion set has a drop factor of 20 gtt/mL. What is the flow rate in gtt/min?