Chapter 13

INTRAVENOUS INFUSIONS, PARENTERAL ADMIXTURES, AND RATE-OF-FLOW CALCULATIONS

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- ***Injections*** are sterile pharmaceutical solutions or suspensions of a drug substance in an aqueous or nonaqueous vehicle. They are administered by needle into almost any part of the body

- Most injections are administered into:

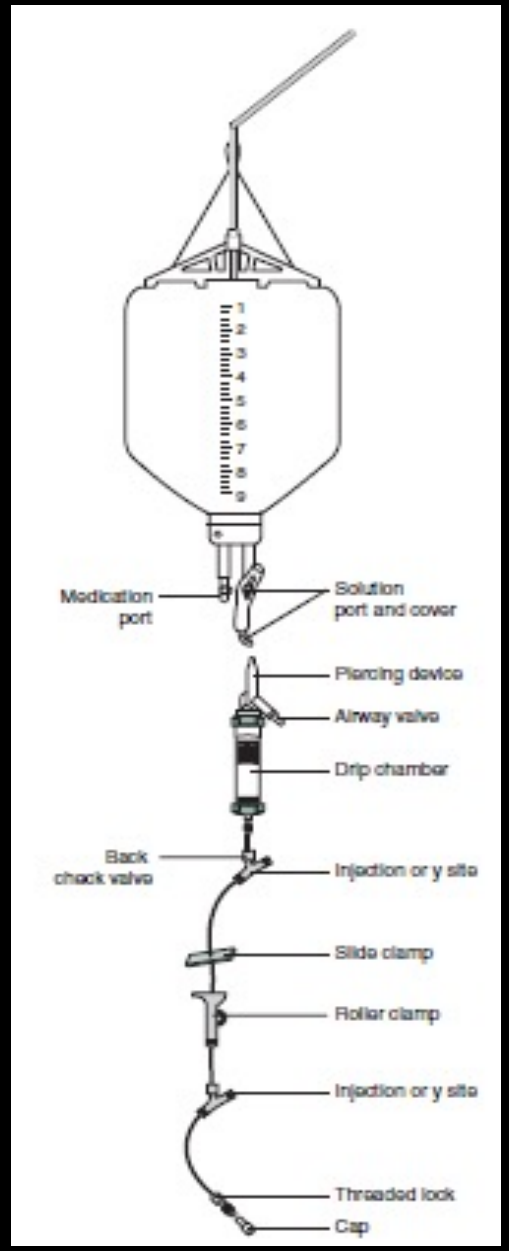
1. Vein (*intravenous, I.V., IV*)
2. Muscle (*intramuscular, I.M., IM*)
3. Skin (*intradermal, I.D., ID, intracutaneous*)
4. Under the skin (*subcutaneous, sub-Q, SQ, hypodermic*).

- The term ***parenteral*** is defined as *any medication route other than the alimentary canal* and thus includes all routes of injection.
- ***Intravenous (IV) infusions*** are sterile, aqueous preparations administered intravenously in relatively large volumes. They are used to extend blood volume and/or provide electrolytes, nutrients, or medications.
- Most intravenous infusions are solutions; however, some are very fine dispersions of nutrients or therapeutic agents, or blood and blood products.
- Although some intravenous solutions are isotonic or nearly isotonic with blood, isotonicity is not absolutely necessary because the volumes of fluid usually administered are rapidly diluted by the circulating blood.

- An ***administration set*** is attached to an intravenous bottle or bag to deliver the fluid into a patient's vein. The sets may be standard (macrodrip) or pediatric (microdrip).

- The drip rate can vary from 10 to 15 drops/mL for standard sets to 60 drops/mL for microdrip sets.

- The drip rate for blood transfusion sets is usually 10 to 15 drops/mL with infusions of 250 to 500 mL administered over a 2- to 4-hour period.



- Intravenous infusions may be continuous or intermittent. In ***continuous infusions***, large volumes of fluid (i.e., 250 to 1000 mL), with or without added drug, are run into a vein uninterrupted,
- whereas ***intermittent infusions*** are administered during scheduled periods.
- The rapid infusion of a medication into a vein is termed ***IV push (IVP)*** and is usually conducted in less than a minute (***bolus*** dose).

- Aqueous solutions of :
- dextrose, sodium chloride, and lactated Ringer's solution are the most commonly used intravenous fluids

TABLE 13.1 SOME COMMON INTRAVENOUS INFUSION SOLUTIONS

SOLUTION[a]	ABBREVIATION
0.9% Sodium Chloride	NS (Normal Saline)
0.45% Sodium Chloride	½NS
5% Dextrose in Water	D5W or D_5W
10% Dextrose in Water	D10W or $D_{10}W$
5% Dextrose in 0.9% Sodium Chloride	D5NS or D_5NS
5% Dextrose in 0.45% Sodium Chloride	D5½NS or $D_5$1/2NS
Lactated Ringer's (0.86% Sodium Chloride, 0.03% Potassium Chloride, 0.033% Calcium Chloride)	LR
5% Dextrose in Lactated Ringer's	D5LR or D_5LR

EXAMPLE CALCULATIONS OF BASIC INTRAVENOUS INFUSIONS

- ***How many grams each of dextrose and sodium chloride are used to prepare a 250-mL bag of* D5 $_{1/2}$NS for intravenous infusion ?**

250 mL * 0.05 (5% w/v) 12.5 g dextrose, and
250 mL * 0.0045 (0.45% w/v) 1.125 g sodium chloride, *answers.*

- **Compare (a) the number of drops and (b) the length of time, in minutes, required to deliver 50-mL of intravenous solutions when using a microdrip set, at 60 drops/mL, and a standard administration set, at 15 drops/mL, if in each case one drop is to be administered per second.**

Microdrip set:

(a) 60 drops/mL * 50 mL=3000 drops

(b) 3000 drops ÷ 60 drops/minute

= 50 minutes, *answers.*

Standard set:

(a) 15 drops/mL 50 mL=750 drops

(b) 750 drops ÷ 60 drops/minute

= 12.5 minutes, *answers.*

EXAMPLE CALCULATIONS OF IV PUSH DRUG ADMINISTRATION

- ***A physician orders enalaprilat (VASOTEC IV) 2 mg IVP for a hypertensive patient. A pharmacist delivers several 1-mL injections, each containing 1.25 mg of enalaprilat. How many milliliters of the injection should be administered ?***

1 mL 1.25 mg

X mL 2 mg

X = 1.6 mL

(1 mL from one syringe and 0.6 mL from another), *answer.*

- ***A physician orders midazolam hydrochloride (VERSED) 2 mg IV Stat. A pharmacist delivers a vial containing midazolam hydrochloride 5 mg/mL. How many milliliters should be administered ?***

1 mL 5 mg

X mL 2 mg

X mL = 0.4

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THANK YOU