Chapter 13

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

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General guidelines in the treatment of severe diabetic ketoacidosis include an initial bolus dose of 0.1 to 0.4 unit of insulin/kg IVP, followed by an insulin drip. Calculate the bolus dosage range for a 200-lb patient.

$$200 \text{ lb} \div 2.2 \text{ lb/kg} = 90.9 \text{ kg},$$
$$90.9 \text{ kg} \times 0.1 \text{ unit/kg} = 9.09 \text{ units, and}$$
$$90.9 \text{ kg} \times 0.4 \text{ unit/kg} = 36.36 \text{ units, } \textit{answers.}$$

EXAMPLE CALCULATIONS OF PEDIATRIC INFUSIONS

- ***Calculate the daily infusion volume of* D10W *to be administered to a neonate weighing 3 lb. 8 oz. on the basis of 60 mL/kg/day.***

  3 lb. 8 oz. = 3.5 lb. ÷ 2.2 lb./kg = 1.59 kg or 1.6 kg

  1.6 kg * 60 mL = 96 mL, *answer.*

- ***Using an administration set that delivers 60 drops/mL at 20 drops per minute, calculate the total time for the above infusion.***

  No. of drops: 96 mL * 60 drops/mL = 5760 drops

  5760 drops / 20 drops/min = 288 min or 4 hrs. 48 min, *answer.*

- ***Gentamicin sulfate, 2.5 mg/kg, is prescribed for a 1.5-kg neonate. Calculate (a) the dose of the drug, and (b) when the drug is placed in a 50-mL IV bag, the flow rate, in mL/minute, if the infusion is to run for 30 minutes.***

(a) 2.5 mg/kg * 1.5 kg = 3.75 mg gentamicin sulfate

(b) 50 mL ÷ 30 minutes = 1.67 mL/minute, *answers.*

INTRAVENOUS ADMIXTURES

- The preparation of intravenous admixtures involves the **addition** of one or more drugs to large volume sterile fluids such as sodium chloride injection, dextrose injection, lactated Ringer's injection, and others.

- The additives are generally in the form of small-volume sterile solutions packaged in ampuls or vials.

- In any properly administered intravenous admixture program, all basic fluids (large-volume solutions), additives (already in solution or extemporaneously constituted), and *calculations* must be carefully checked against the medication orders.

EXAMPLE CALCULATIONS OF ADDITIVES TO INTRAVENOUS INFUSION SOLUTIONS

- ***A medication order for a patient weighing 154 lb. calls for 0.25 mg of amphotericin B per kilogram of body weight to be added to 500 mL of 5% dextrose injection. If the amphotericin B is to be obtained from a constituted injection that contains 50 mg/10 mL, how many milliliters should be added to the dextrose injection?***

1 kg = 2.2 lb.

154 lb. / 2.2 = 70 kg

Dose in mg: 0.25 mg * 70 = 17.5 mg

constituted injection that contains 50 mg/10 mL

50 mg	10 mL
17.5 mg	X mL

X = 3.5 mL, *answer.*

RATE OF FLOW OF INTRAVENOUS FLUIDS

- On medication orders, the physician specifies the rate of flow of intravenous fluids in milliliters per minute, drops per minute, amount of drug (as milligrams per hour), or, more frequently, as the approximate duration of time of administration of the total volume of the infusion.

$$\text{Rate of flow (drops/minute)} = \frac{\text{Volume infusion (mL)} \times \text{Drip set (drops/mL)}}{\text{Time (minutes)}}$$

A medication order calls for 1000 mL of D5W to be administered over an 8-hour period. Using an IV administration set that delivers 10 drops/mL, how many drops per minute should be delivered to the patient?

solving by the equation:

$$\text{Rate of flow (drops/minute)} = \frac{\text{Volume infused (mL)} \times \text{Drip set (drops/mL)}}{\text{Time (minutes)}}$$

$$= \frac{1000 \text{ mL} \times 10 \text{ drops/mL}}{480 \text{ minutes}}$$

$$= 20.8 \text{ or } 21 \text{ drops per minute, } \textit{answer}.$$

- **Ten (10) milliliters of 10% calcium gluconate injection and 10 mL of multivitamin infusion are mixed with 500 mL of a 5% dextrose injection. The infusion is to be administered over 5 hours. If the dropper in the venoclysis set calibrates 15 drops/mL, at what rate, in drops per minute, should the flow be adjusted to administer the infusion over the desired time interval?**

Total volume of infusion =
10 mL + 10 mL + 500 ml = 520 mL
Dropper calibrates 15 drops/mL
520 × 15 drops = 7800 drops

$$\frac{7800 \text{ (drops)}}{300 \text{ (minutes)}} = 26 \text{ drops per minute, } \textit{answer.}$$

Or, solving by the equation:

$$\text{Rate of flow (drops/minute)} = \frac{\text{Volume infused (mL)} \times \text{Drip set (drops/mL)}}{\text{Time (minutes)}}$$

$$= \frac{520 \text{ mL} \times 15 \text{ drops/mL}}{300 \text{ minutes}}$$

$$= 26 \text{ drops per minute, } \textit{answer.}$$

If 10 mg of a drug are added to a 500-mL large-volume parenteral fluid:

(a) what should be the rate of flow, in milliliters per hour, to deliver 1 mg of drug per hour?

$$\frac{10\ (\text{mg})}{1\ (\text{mg})} = \frac{500\ (\text{mL})}{x\ (\text{mL})}$$

$$x = 50\ \text{mL per hour, } \textit{answer.}$$

(b) If the infusion set delivers 15 drops/mL, what should be the rate of flow in drops per minute?

$$15\ \text{drops/mL} \times 50\ \text{mL/hr} = 750\ \text{drops per hour}$$

$$\frac{750\ (\text{drops})}{x\ (\text{drops})} = \frac{60\ (\text{minutes})}{1\ (\text{minute})}$$

$$x = 12.5\ \text{drops/minute, } \textit{answer.}$$

(c) How many hours should the total infusion last?

$$\frac{50\ (\text{mL})}{500\ (\text{mL})} = \frac{1\ (\text{hour})}{x\ (\text{hour})}$$

$$x = 10\ \text{hours, } \textit{answer.}$$

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THANK YOU