SECTION 7

Pediatric Medication Calculations

CHAPTER 20
Pediatric Oral and Parenteral Medications

CHAPTER 21
Pediatric Intravenous Medications
CHAPTER 20

Pediatric Oral and Parenteral Medications

Objectives
The learner will:
1. explain how suspensions are measured and administered.
2. calculate pediatric oral dosages.
3. list the precautions of IM and subcutaneous injection in infants and children.
4. calculate pediatric IM and subcutaneous dosages.

Suggested Review Questions
1. What are the guidelines for measuring and administering medications supplied as a suspension?
2. What are the precautions related to preparing and administering medications to infants and children using the IM or subcutaneous route? Why are these precautions necessary?
3. What formula is used when calculating pediatric medication dosages? What are the essential elements to remember when calculating pediatric medication dosages?

Answers to Review Questions
1. Guidelines for measuring and administering medications supplied as a suspension to ensure proper dosing include
   a. Mix medication thoroughly immediately prior to pouring the medication.
   b. Pour into plastic medicine cup or draw into oral syringe appropriately calibrated to volume prescribed.
   c. Administer promptly after medication is poured to prevent settling out of the insoluble components of the mixture.
   d. Verify that child has swallowed the medication.
2. When administering medications for IM or subcutaneous injection to children it is essential to inject the medications into the appropriate tissue in order to achieve the desired rate of medication absorption. The subcutaneous tissue of the upper arm is the preferred
site for immunizations given via the subcutaneous route. Sites of insulin injections should be rotated using a specific schedule. Prepared insulin doses should be double-checked with another nurse to avoid critical medication errors.

The vastus lateralis muscle is the preferred site for IM injections in infants and children up to age 3. The vastus lateralis is the largest muscle mass in children under the age of 3 and is free of major nerves and blood vessels. The vastus lateralis or ventrogluteal site can be used in children over the age of 3. The ventrogluteal site is also free of major nerves and blood vessels, but properly positioning a child under the age of 3 for injection into the ventrogluteal muscle can be difficult. Injections using the ventrogluteal site tend to be less painful than those using the vastus lateralis site. If absolutely necessary, the dorsogluteal muscle can be used for IM injections in children over the age of 3 years. However, it is recommended that the dorsogluteal muscle be avoided due to the potential for damage to the sciatic nerve. The volume of medication injected per site is usually limited to 1 mL.

3. The dimensional analysis process used to calculate medication dosages in adults can also be used when calculating medication dosages in children. The majority of medications in children are ordered in milligrams of drug per kilogram of body weight (mg/kg) or per square meters (m²) based on body surface area (BSA). If using a nomogram to determine BSA, be sure to use a pediatric nomogram. Pediatric medication dosages are usually calculated to the nearest hundredth and measured using a tuberculin syringe. All pediatric dosages must be compared with the safe dose range as published in the medication package insert, hospital formulary, or United States Pharmacopeia.
Chapter 20: Pediatric Oral and Parenteral Medications

Additional Practice Problems

Read the labels below to prepare the pediatric doses indicated. Calculate dosages to nearest hundredth.

1. 100 mg of cefaclor PO

2. 200 mg of cefaclor PO

3. Biaxin® 100 mg PO
4. 125 mg of valproic syrup PO

5. 60 mg of acetaminophen PO

6. 200 mg of clindamycin IV

7. 15 mg of meperidine IM
8. 3 mg of morphine IM

9. 75 mg of Dilantin® PO

Prepare the pediatric doses ordered from the medication preparation available. Calculate dosages to nearest hundredth.

10. Ordered: tetracycline 75 mg PO
    Available: tetracycline oral suspension 125 mg/5 mL

11. Ordered: digoxin 0.125 mg PO
    Available: digoxin elixir 50 mcg/mL

12. Ordered: penicillin 500,000 units IM
    Available: penicillin 1,000,000 units/mL

13. Ordered: clindamycin 60 mg PO
    Available: clindamycin oral solution 75 mg/5 mL

14. Ordered: fluconazole 60 mg PO
    Available: fluconazole oral suspension 40 mg/mL
15. Ordered: methylprednisolone 20 mg IM  
   Available: methylprednisolone 125 mg/mL  

16. Ordered: furosemide 32 mg PO  
   Available: furosemide oral solution 40 mg/5 mL  

17. Ordered: erythromycin 160 mg PO  
   Available: erythromycin oral suspension 200 mg/5 mL  

18. Ordered: kanamycin 45 mg IM  
   Available: kanamycin sulfate 75 mg/2 mL  

19. Ordered: azithromycin 180 mg PO  
   Available: azithromycin oral suspension 200 mg/5 mL  

20. Ordered: cefuroxime 375 mg IM  
   Available: cefuroxime 750 mg/mL
Solutions to Additional Practice Problems

Read the labels below to prepare the pediatric doses indicated. Calculate dosages to nearest hundredth.

1. \[ \frac{1}{5} \text{ mL} \times \frac{2}{100} \text{ mg} = \frac{2}{250} \text{ mL} = 2 \text{ mL} \]

2. \[ \frac{1}{5} \text{ mL} \times \frac{8}{200} \text{ mg} = \frac{8}{125} \text{ mL} = 8 \text{ mL} \]

3. \[ \frac{1}{5} \text{ mL} \times \frac{4}{100} \text{ mg} = \frac{4}{125} \text{ mL} = 4 \text{ mL} \]

4. \[ \frac{5}{2} \text{ mL} \times \frac{1}{125} \text{ mg} = \frac{5}{250} \text{ mL} = 2.5 \text{ mL} \]

5. \[ \frac{0.6}{1} \text{ mL} \times \frac{1}{60} \text{ mg} = \frac{0.6}{60} \text{ mL} = 0.6 \text{ mL} \]

6. \[ \frac{1}{3} \text{ mL} \times \frac{4}{200} \text{ mg} = \frac{4}{180} \text{ mL} = 1.333 \text{ mL} \text{ rounded to nearest hundredth} = 1.33 \text{ mL} \]

7. \[ \frac{1}{3} \text{ mL} \times \frac{3}{15} \text{ mg} = \frac{3}{25} \text{ mL} = 0.6 \text{ mL} \]

8. \[ \frac{1}{3} \text{ mL} \times \frac{3}{10} \text{ mg} = \frac{3}{30} \text{ mL} = 0.3 \text{ mL} \]
9. \[ \frac{3}{2} \text{mg} \times \frac{1}{250} \text{mg} = \frac{3}{2} = 1.5 \text{mL} \]

Prepare the pediatric doses ordered from the medication preparation available. Calculate dosages to nearest hundredth.

10. \[ \frac{3}{2} \text{mg} \times \frac{1}{125} \text{mg} = 3 \text{mL} \]

11. Insert mcg to mg conversion into DA equation or convert mcg to mg before developing equation. Example solution shows mcg to mg conversion in the DA equation.

\[ \frac{1}{50} \text{mcg} \times \frac{1000}{1} \text{mg} \times \frac{0.125}{50} \text{mg} = \frac{125}{50} = 2.5 \text{mL} \]

12. \[ \frac{1}{2} \text{units} \times \frac{500,000}{1} \text{units} = \frac{1}{2} = 0.5 \text{mL} \]

13. \[ \frac{4}{5} \text{mg} \times \frac{60}{1} \text{mg} = 4 \text{mL} \]

14. \[ \frac{3}{2} \text{mg} \times \frac{60}{40} \text{mg} = \frac{3}{2} = 1.5 \text{mL} \]

15. \[ \frac{4}{25} \text{mg} \times \frac{4}{20} \text{mg} = \frac{4}{25} = 0.16 \text{mL} \]

16. \[ \frac{4}{2} \text{mg} \times \frac{32}{40} \text{mg} = 4 \text{mL} \]

17. \[ \frac{4}{160} \text{mg} \times \frac{4}{280} \text{mg} = 4 \text{mL} \]
18. \[
mL = \frac{2 \text{ mL}}{\frac{15}{200} \text{ mg}} \times \frac{9}{375} \text{ mg} = \frac{18}{15} \text{ mL} = 1.2 \text{ mL}
\]

19. \[
mL = \frac{1 \text{ mL}}{\frac{100}{180} \text{ mg}} \times \frac{9}{375} \text{ mg} = \frac{9}{2} \text{ mL} = 4.5 \text{ mL}
\]

20. \[
mL = \frac{1 \text{ mL}}{\frac{150}{200} \text{ mg}} \times \frac{1}{375} \text{ mg} = \frac{1}{2} \text{ mL} = 0.5 \text{ mL}
\]