



Pediatric Dosages

LEARNING OBJECTIVES

On completion of the materials provided in this chapter, you will be able to perform computations accurately by mastering the following mathematical concepts:

- 1 Converting the weight of a child from pounds to kilograms
- 2 Converting the neonate and infant weight from grams to kilograms
- 3 Performing pediatric dosage calculations
- 4 Calculating the single or individual dose of medications
- 5 Determining whether the prescribed dose is safe and therapeutic
- 6 Calculating a safe and therapeutic 24-hour dosage range
- 7 Calculating the single dose range from a 24-hour dosage range
- 8 Determining whether the actual dosage (in milligrams per kilograms per 24 hours) is safe to administer
- 9 Calculating pediatric IV solutions
- 10 Administering IV medications to pediatric patients
- 11 Calculating the daily fluid requirements for infants and young children
- 12 Calculating the body surface area (BSA) for medication administration



Children are more sensitive than adults to medications because of their weight, height, physical condition, immature systems, and metabolism. Nurses who administer medications to infants and children must be vigilant in determining whether the patient is receiving the correct medication. The correct dose is one of the six rights of drug administration: right patient, medication, route, time, dose, and documentation.

The physician or provider will prescribe the medication to be delivered. However, the nurse is responsible for detecting any errors in calculation of dosage, as well as for preparing the medication and administering the drug. The nurse needs to be aware that pediatric dosages are often less than 1 mL; therefore a tuberculin syringe is used for accurate dosing.

Pediatric medications are calculated using the infant or child's kilogram weight. The dosages have been established by the drug companies. Safe and therapeutic (S&T) dosages are readily available from a reliable source such as *The Harriet Lane Handbook*.

In general, pediatric dosages are rounded to the nearest tenth. For infants and young children, doses may be rounded to the nearest hundredth. The child who weighs more than

ALERT

Never exceed the adult dose or maximum dose recommended.

50 kg may receive adult dosages. If the calculated dose is greater than the recommended adult dose, DO NOT administer the medication. A child should not receive higher doses than those recommended for the adult, ever. Many drugs have a “do not exceed” or “max. dose” in 24 hours listed; this must always be considered.

Additionally, the physician or pharmacist may use the child’s body surface area (BSA) to calculate a dosage of medication to administer. The BSA calculation may be used when an established dosage has not been determined by the drug company, as with some anticancer or specialized drugs.

KILOGRAM CONVERSIONS

Converting Pounds to Kilograms

The formula: 2.2 lb = 1 kg

Infant’s and young children’s weight in pounds must be converted to kilograms to accurately calculate medication doses and daily fluid requirements. S&T drug dosages have been established using kilogram weights.

Always round the kilogram weight to the nearest tenth, NOT a whole number.

EXAMPLE 1: An infant weighs 24 lb. Convert the infant’s weight to kilograms.

Proportion	Formula Setup
$2.2 \text{ lb} : 1 \text{ kg} :: 24 \text{ lb} : x \text{ kg}$	$\frac{2.2 \text{ lb}}{1 \text{ kg}} = \frac{24 \text{ lb}}{x \text{ kg}}$
$2.2 : 1 :: 24 : x$	$2.2x = 24$
$2.2x = 24$	$x = 10.9 \text{ kg}$
$x = \frac{24}{2.2}$	
$x = 10.9 \text{ kg}$	

EXAMPLE 2: A child weighs 47 lb. Convert the child’s weight to kilograms.

$2.2 \text{ lb} : 1 \text{ kg} :: 47 \text{ lb} : x \text{ kg}$	$\frac{2.2 \text{ lb}}{1 \text{ kg}} = \frac{47 \text{ lb}}{x \text{ kg}}$
$2.2 : 1 :: 47 : x$	$2.2x = 47$
$2.2x = 47$	$x = 21.4 \text{ kg}$
$x = \frac{47}{2.2}$	
$x = 21.36 \text{ kg}$ or 21.4 kg (rounded to the nearest tenth)	

Converting Grams to Kilograms

The formula: 1000 g = 1 kg

Newborn (neonate) and some infant weights are measured in grams. Converting grams to kilograms is done as shown below or by simply dividing the number of grams by 1000.

EXAMPLE 1: A neonate weighs 2300 g. Convert to kilograms.

$$\begin{aligned}
 1000 \text{ g} : 1 \text{ kg} &:: 2300 \text{ g} : x \text{ kg} \\
 1000 : 1 &:: 2300 : x \\
 1000x &= 2300 \\
 x &= 2.3 \text{ kg}
 \end{aligned}$$

EXAMPLE 2: A newborn weighs 4630 g at birth. Convert to kilograms.

$$1000 \text{ g} : 1 \text{ kg} :: 4630 \text{ g} : x \text{ kg}$$

$$1000 : 1 :: 4630 : x$$

$$1000x = 4630$$

$$x = 4.63 \text{ kg, or } 4.6 \text{ (rounded to the nearest tenth)}$$

Practice Problems. Convert pounds and grams to kilograms.

1. 27 lb _____ kg
2. 38 lb _____ kg
3. 52 lb _____ kg
4. 5220 g _____ kg
5. 3202 g _____ kg
6. 72 lb _____ kg
7. 16 lb _____ kg
8. 92 lb _____ kg

Answers

- | | | |
|------------|------------|------------|
| 1. 12.3 kg | 4. 5.2 kg | 7. 7.3 kg |
| 2. 17.3 kg | 5. 3.2 kg | 8. 41.8 kg |
| 3. 23.6 kg | 6. 32.7 kg | |

PEDIATRIC DOSAGE CALCULATIONS

In pediatric dosage calculations, you can use a proportion or formula method.

Proportion

or

Formula

$$\text{mg} : \text{mL} :: \text{mg} : x \text{ mL}$$

$$\frac{\text{mg}}{\text{mL}} \times \frac{\text{mg}}{\text{mL}}$$

EXAMPLE 1: The physician orders Benadryl 12.5 mg po q4–6 h prn for itching. The nurse has available Benadryl 25 mg/5 mL. How many milliliters would be needed to administer 12.5 mg? Show math.

$$25 \text{ mg} : 5 \text{ mL} :: 12.5 \text{ mg} : x \text{ mL}$$

$$x = 2.5 \text{ mL}$$

$$\frac{25 \text{ mg}}{5 \text{ mL}} \times \frac{12.5 \text{ mg}}{x \text{ mL}}$$

$$x = 2.5 \text{ mL}$$

EXAMPLE 2: The physician orders morphine 15 mg by intravenous (IV) piggyback (IVPB) now. You have available morphine 10 mg/mL. How much would you give? Show math.

$$10 \text{ mg} : 1 \text{ mL} :: 15 \text{ mg} : x \text{ mL}$$

$$x = 1.5 \text{ mL}$$

$$\frac{10 \text{ mg}}{1 \text{ mL}} \times \frac{15 \text{ mg}}{x \text{ mL}}$$

$$x = 1.5 \text{ mL}$$

CALCULATING THE SINGLE OR INDIVIDUAL DOSE (MILLIGRAMS/DOSE)

Medications such as acetaminophen and ibuprofen are administered as a single dose. This means that each time the infant or child receives the medication, it is calculated in a single or individual dose based on the kilogram weight.

Most of the medications prescribed in this manner are prn medications, which are given as needed for relief of symptoms such as pain, nausea, and fever. Again, the manufacturer of the drug

has established an S&T dosage or range. The nurse is responsible for administering the single dose that is S&T. Therefore it is helpful for the nurse to know how the ordered dose is derived.

To determine the correct single dose for the child, you must calculate the correct dose. A systematic approach is helpful in determining the S&T dose range:

- Change the child's weight in pounds to kilograms.
- Find the recommended dosage in a reliable source.
- Multiply the kilogram weight by the recommended dose(s).
- The answer is the individual or single dose (*mg/dose*) of medication to be given each time the child receives the medication.

EXAMPLE 1: A child weighs 22 lb. The child needs acetaminophen for pain and fever.

- a. Weight** 22 lb = 10 kg
b. Recommended 10 to 15 mg/kg/dose q4–6 h
c. Calculation

$$\begin{array}{ll} 10 \text{ mg} : 1 \text{ kg} :: x \text{ mg} : 10 \text{ kg} & 15 \text{ mg} : 1 \text{ kg} :: x \text{ mg} : 10 \text{ kg} \\ 10 : 1 :: x : 10 & 15 : 1 :: x : 10 \\ x = 100 \text{ mg/dose} & x = 150 \text{ mg/dose} \end{array}$$

The child may receive 100 to 150 mg each time he or she is given acetaminophen. This is the single or individual dose. The dose is both safe and therapeutic for this child.

- A dose smaller than 100 mg is considered **safe but may not be therapeutic for the child's weight**.
- Doses larger than 150 mg are considered too much for the child's weight and may **exceed the therapeutic range**. There are exceptions—some dosages may be higher. Check the *Hariett Lane Handbook* or other pediatric dosing manuals.

EXAMPLE 2: Calculate an S&T dose range of ibuprofen for a child who weighs 36 lb. Ibuprofen is available as 100 mg/5 mL. How many milliliters would you need to administer for the ordered dose to be S&T?

- a. Weight** 36 lb = 16.4 kg
b. Recommended 5 to 10 mg/kg/dose q6–8 h
c. Calculations

$$\begin{array}{ll} 5 \text{ mg} : 1 \text{ kg} :: x \text{ mg} : 16.4 \text{ kg} & 10 \text{ mg} : 1 \text{ kg} :: x \text{ mg} : 16.4 \\ 5 : 1 :: x : 16.4 & 10 : 1 :: x : 16.4 \\ x = 82 \text{ mg/dose} & x = 164 \text{ mg/dose} \end{array}$$

The S&T single dose range for this child is 82 to 164 mg/dose.

- d.** Now perform dosage calculations for the single dose range using the 100 mg/5 mL strength:

$$\begin{array}{ll} 100 \text{ mg} : 5 \text{ mL} :: 82 \text{ mg} : x \text{ mL} & 100 \text{ mg} : 5 \text{ mL} :: 164 \text{ mg} : x \text{ mL} \\ x = 4.1 \text{ mL} & x = 8.2 \text{ mL} \end{array}$$

! ALERT

Acetaminophen:

Never give more than 5 doses in 24 hours to the infant or young child.
Never exceed 4000 mg/day (4 grams) for the older child and adult.
Teach parents or caregiver.

DETERMINE WHETHER THE PRESCRIBED DOSE IS SAFE AND THERAPEUTIC (MILLIGRAMS/KILOGRAM/DOSE)

This method will determine whether the child is receiving an S&T dosage of the drug that is prescribed by the physician. The nurse must determine whether the ordered dose is within the recommended range.

Even though the physician has prescribed the medication to be given, it is the nurse's responsibility to determine whether the dose is S&T to administer to the child. This is done by **dividing the ordered dosage by the child's weight in kilograms (mg/kg/dose)**. A systematic approach is needed.

- Obtain the child's weight in kilograms.
- Obtain the ordered dosage.
- Divide the ordered dose by the child's weight.
- The answer is the mg/kg/dose (for each dose administered).
- Check your drug book to determine whether the ordered dose is S&T (in the recommended dosage range).

EXAMPLE: The doctor has ordered 210 mg of acetaminophen q4–6 h for pain and fever for a postoperative child. The child weighs 39 lb. The recommended dose range for acetaminophen is 10 to 15 mg/kg/dose q4–6 h. Acetaminophen is supplied as 160 mg/5 mL.

Is the ordered dose S&T to administer? If the dose ordered is S&T to administer, how many milliliters will be needed?

- a. Weight 39 lb = 17.7 kg
b. Ordered 210 mg q4–6 h
c. Calculation $\frac{210 \text{ mg/dose}}{17.7 \text{ kg}} = 11.86 \text{ or } 11.9 \text{ mg/kg/dose}$
d. Recommended 10 to 15 mg/kg/dose

The patient will receive 11.9 mg/kg/dose. Yes, it is safe to administer the acetaminophen because it is within the S&T dosage range of 10 to 15 mg/kg/dose.

- e. Perform dosage calculation using 160 mg/5 mL concentration:

$$160 \text{ mg} : 5 \text{ mL} :: 210 \text{ mg} : x \text{ mL}$$

$$160x = 1050$$

$$x = 6.6 \text{ mL rounded to the nearest tenth}$$

Remember to round all doses to the nearest tenth.

Exceptions: Round all narcotics, antiepileptics, and cardiac medications to *nearest hundredth*. Medications that may be rounded to the nearest hundredth include phenobarbital, morphine, dilantin, digoxin, and anticancer drugs.

CALCULATE THE 24-HOUR DOSAGE (RANGES)

Many drugs are calculated based on the recommended 24-hour dose, then divided into single doses to be given every 12, 8, 6, or 4 hours or as recommended by the drug manufacturers. These divided time schedules vary, and the physician, nurse practitioner, or physician's assistant will order the medication based on the recommended schedules.

Antibiotics especially are given this way. Additionally, an antibiotic may be given in dosages or ranges that have been found to be effective for the child's diagnosis. The physician chooses how often the medication is to be delivered. An example of an antibiotic with many dosing choices is ampicillin.

Recommended dosages for ampicillin may be any of the following:

<2 kg	50 to 100 mg/kg/24 h/q8 h
>2 kg	100 to 200 mg/kg/24 h/q8 h
Mild to moderate infection	100 to 200 mg/kg/24 h/q6 h
Severe infection	200 to 400 mg/kg/24 h/q4–6 h

The physician must determine the dosage to be given to the infant or child. If an infant or child is diagnosed with otitis media (OM), then the physician may choose the dosage of antibiotic in the mild to moderate range. However, if an infant is admitted with a diagnosis of fever of undetermined origin, sepsis, or meningitis, then the physician may decide to prescribe a larger dosage of the antibiotic, as in the severe infection range.

Knowing the diagnosis is helpful in determining whether the infant or child will be receiving S&T dosages of antibiotics. Nurses who administer antibiotics or antiinfectives can learn how to determine the doses needed for the patient. **However, only the physician, advanced practice nurse, or physician assistant can prescribe and order the infant's or child's medications.**

EXAMPLE 1: An infant is admitted to the hospital to rule out sepsis. The infant weighs 8 lb. Ampicillin is prescribed. Calculate an S&T 24-hour dosage range for this infant with a possible severe infection.

- Weight 8 lb = 3.6 kg
- Recommended 200 to 400 mg/kg/24 h q4–6 h
- Calculation $3.6 \text{ kg} \times 200 \text{ mg/kg/24 h} = 720 \text{ mg/24 h}$
 $3.6 \text{ kg} \times 400 \text{ mg/kg/24 h} = 1440 \text{ mg/24 h}$
- 24-hour dosage range 720 to 1440 mg/24 h

This means the infant can receive 720 to 1440 mg of ampicillin in a 24-hour period.

EXAMPLE 2: The child weighs 35 lb and is diagnosed with OM. The physician prescribes amoxicillin. Calculate an S&T 24-hour dosage range for this patient.

- Weight 35 lb = 15.9 kg
- Recommended 25 to 50 mg/kg/24 h two or three times a day
Adult dosage 250 to 500 mg/dose two times a day
- Calculation $15.9 \text{ kg} \times 25 \text{ mg/kg/24 h} = 397.5 \text{ mg/24 h}$
 $15.9 \text{ kg} \times 50 \text{ mg/kg/24 h} = 795 \text{ mg/24 h}$
- 24-hour dosage range 397.5 to 795 mg/24 h

The child may receive 397.5 to 795 mg/24 h of amoxicillin. **Remember not to exceed the adult dose or “max” dose.** The physician will now decide how often the child will receive the medication. This is called the individual or single dose, based on 24 hours.

CALCULATE THE INDIVIDUAL DOSE OR SINGLE DOSE (MILLIGRAMS/KILOGRAM/24 HOURS DIVIDED)

The physician will now determine how often the antibiotic will be administered as a single or individual dose. First determine the 24-hour dosage range. Then divide the 24-hour dosage into single doses (the number of times per day the medication is to be given).

- This is the individual dose each time the patient receives the medication.
- These times are established by the drug companies (e.g., q4 h, q6 h, q8 h, q12 h, or every day).
- **As long as the dose does not exceed the maximum dose established in 24 hours and the dose does not exceed the adult dose, then it can be given safely.**
- The physician will decide how often the medication is to be given.

EXAMPLE 1: A child weighs 22 lb. The physician prescribes ampicillin 100 to 200 mg/kg/24 h divided q6 h. Calculate the individual dose for ampicillin.

- | | |
|--------------------------------------|---|
| a. Weight | 22 lb = 10 kg |
| b. Recommended | 100 to 200 mg/kg/24 h divided q6 h |
| c. Calculation | 10 kg \times 100 mg/kg/24 h = 1000 mg/24 h
10 kg \times 200 mg/kg/24 h = 2000 mg/24 h |
| d. Divided q6 h
(4 doses in 24 h) | $\frac{1000 \text{ mg}/24 \text{ h}}{4 \text{ doses}/24 \text{ h}}$ $\frac{2000 \text{ mg}/24 \text{ h}}{4 \text{ doses}/24 \text{ h}}$ |
| e. Single dose range | 250 to 500 mg/dose |

EXAMPLE 2: A child weighs 60 lb. The physician orders cefuroxime. The recommended dosage is 75 to 100 mg/kg/24 h q8 h. What is the S&T dosage or range for this child?

- | | |
|--------------------------------------|---|
| a. Weight | 60 lb = 27.3 kg |
| b. Recommended | 75 to 100 mg/kg/24 h q8 h |
| c. Calculation | 27.3 kg \times 75 mg/kg/24 h = 2047.5 mg/24 h
27.3 kg \times 100 mg/kg/24 h = 2730 mg/24 h |
| d. Divided q8 h
(3 doses in 24 h) | $\frac{2047.5 \text{ mg}/24 \text{ h}}{3 \text{ doses}/24 \text{ h}}$ $\frac{2730 \text{ mg}/24 \text{ h}}{3 \text{ doses}/24 \text{ h}}$ |
| e. Single dose range | 682.5 to 910 mg/dose |

DETERMINE THE ACTUAL MILLIGRAMS/KILOGRAM/ 24 HOURS OR DOSE/KILOGRAM/24 HOURS

The nurse must understand how to *prove* that the patient is actually receiving an S&T dosage or range. When a physician prescribes a medication, he or she has a range from which to choose. As a nurse, you need to check to see whether the medication falls within the recommended dosage or range. This is important because medication doses are patient–weight specific.

Determining the actual milligrams per kilogram per 24 hours that the patient is receiving is done simply by dividing the actual milligrams to be given in 24 hours by the patient’s weight. Remember that the physician has already prescribed the medication based on the recommended dose in milligrams per kilogram per 24 hours. **For nurses, knowing how to prove S&T dosing is critical.**

To determine (prove) whether the patient is receiving an S&T dosage, the nurse will need to:

- Obtain the infant’s or child’s kilogram weight.
- Obtain the medication order.
- Determine the amount of medication the child will receive in the 24-hour period (the 24-hour dosage).
- **Divide the prescribed 24-hour dosage by the patient’s weight.**
- Compare the ordered dosage with the recommended dosage.

There is no need to calculate a dosage range, since the physician has already done this.

EXAMPLE 1: A 4-year-old child is receiving vancomycin 220 mg q6 h IV via syringe pump. She weighs 48 lb. Recommended dosage is 40 to 60 mg/kg/24 h q6 h.

How many milligrams per kilogram per 24 hours is this child receiving? Is the ordered dosage S&T?

- a. Weight 48 lb = 21.8 kg
- b. Ordered Vancomycin 220 mg q6 h
- c. 24-hour dosage 220 mg \times 4 doses = 880 mg/24 h
- d. mg/kg/24 h $\frac{24\text{-h dose}}{\text{Weight (kg)}} = \frac{880 \text{ mg/24 h}}{21.8 \text{ kg}} = 40.36$ or 40.4 mg/kg/24 h
- e. Recommended 40 to 60 mg/kg/24 h q6-8 h

The patient is receiving 40.4 mg/kg/24 h, which is within the S&T range.

EXAMPLE 2: A 75-lb patient is receiving 900 mg of ampicillin IVPB q6 h. How many milligrams per kilogram per 24 hours is the patient receiving? Is the dosage S&T?

- a. Weight 75 lb = 34.1 kg
- b. Ordered Ampicillin 900 mg IVPB q6 h
- c. 24-hour dosage 900 mg \times 4 doses = 3600 mg/24 h
- d. mg/kg/24 h $\frac{3600 \text{ mg/24 h}}{34.1 \text{ kg}} = 105.6$ mg/kg/24 h
- e. Recommended 100 to 200 mg/kg/24 h q6-8 h

The patient is receiving an S&T dose at 105.6 mg/kg/24 h. Between 100 and 200 mg/kg/24 h is safe.

CALCULATING PEDIATRIC IV SOLUTIONS

Pediatric patients require smaller volumes of IV fluids and medications than adults. An IV pump, a buretrol (soluset), or both may be used for the pediatric patient. Each facility has guidelines for preparing and administering IV solutions and medications to the pediatric patient. Also, for a pediatric patient, IV tubing with a drop factor of 60 gtt/mL is usually recommended.

The concentration of the IV medication is also an important factor in medication administration. Administering a medication with a higher concentration than recommended is avoided because of the vein irritation that can result.

EXAMPLE 1: Infuse 100 mL of 0.9% NS over 5 hours to a 6-month-old child. How many milliliters per hour should the IV pump be programmed for?

The formula:
$$\frac{\text{Total volume to be infused}}{\text{Total time in hours}} = x \text{ mL/h}$$

(Formula setup)
$$\frac{100 \text{ mL}}{5 \text{ h}} = 20 \text{ mL/h}$$

EXAMPLE 2: Infuse 150 mL of D₅LR over 3 hours to a 3-year-old child. How many milliliters per hour should the IV pump be programmed for?

(Formula setup)
$$\frac{150 \text{ mL}}{3 \text{ h}} = 50 \text{ mL/h}$$

If an IV pump is not used, IV fluids may be given by gravity. In this case, the formula is

$$\frac{\text{Total volume to be given}}{\text{Total time in minutes}} \times \text{Tubing drop factor} = x \text{ gtt/min}$$

EXAMPLE 3: Infuse 200 mL lactated Ringer's solution (LR) over 4 hours to an 8-year-old child. The tubing drop factor is 60 gtt/mL. How many drops per minute of LR should be infused?

$$\begin{aligned} \text{(Formula setup)} \quad & \frac{200 \text{ mL}}{240 \text{ min}} \times \frac{1}{4} \times 60 \text{ gtt/mL} = x \text{ gtt/min} \\ & \frac{200}{4 \text{ min}} \times 1 \text{ gtt} = 50 \text{ gtt/min} \end{aligned}$$

EXAMPLE 4: Infuse 500 mL of D₅W over 8 hours to a 14-year-old child. The tubing drop factor is 60 gtt/mL. How many drops per minute of D₅W should be infused?

a. Convert hours to minutes.

$$1 \text{ h} : 60 \text{ min} :: 8 \text{ h} : x \text{ min}$$

$$x = 480 \text{ min}$$

b. Calculate gtt/min.

$$\begin{aligned} \text{(Formula setup)} \quad & \frac{500 \text{ mL}}{480 \text{ min}} \times \frac{1}{8} \times 60 \text{ gtt/mL} = x \text{ gtt/min} \\ & \frac{500}{8 \text{ min}} \times 1 \text{ gtt} = 62.5 \text{ or } 63 \text{ gtt/min} \end{aligned}$$

ADMINISTRATION OF IV MEDICATIONS TO PEDIATRIC PATIENTS

The formulas to calculate the administration rate of IV medications to pediatric patients are not different from those used for adults. The difference in administration of medications to a pediatric patient lies in the volume of solution used. Pediatric patients require a smaller volume of IV solutions; therefore care must be taken to give the medication at the recommended infusion concentration. Using a concentration that is higher than recommended may result in vein irritation and phlebitis. Unit policies and IV drug books provide the guidelines needed for appropriate concentration of IV medications for the pediatric patient.

If the medication is to be infused with an IV pump, the formula would be

$$\frac{\text{Total volume to be infused}}{\text{Total time for infusion in hours}} = x \text{ mL/h}$$

If the medication is to be infused with a buretrol (soluset) by gravity (Figure 18-1), then the formula would be

$$\frac{\text{Total volume to be infused}}{\text{Total time for infusion in minutes}} \times \text{Drop factor} = x \text{ gtt/min}$$

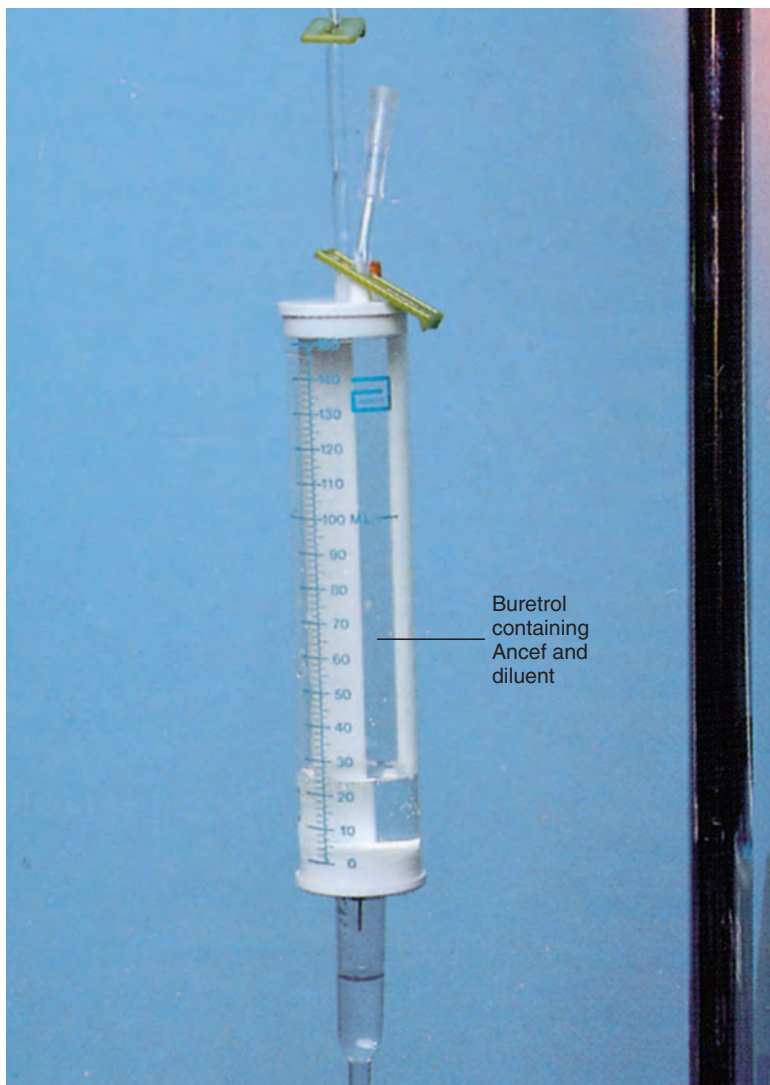


FIGURE 18-1 Dilution of Ancef in volume-control device, also known as a buretrol or soluset. (Modified from Potter PA, Perry AG: *Fundamentals of nursing*, ed 7, St Louis, 2009, Mosby.)

EXAMPLE 1: An 18-month-old child has Ancef 450 mg q4 h IVPB over 15 minutes ordered. The child weighs 19 kg. The maximum recommended infusion concentration is 50 mg/mL. The vial of medication has a concentration of Ancef 250 mg/mL. How many milliliters of medication will provide 450 mg? _____ How many milliliters of IV solution need to be added to the medication to equal the recommended final concentration? _____ How many milliliters per hour should the IV pump be programmed for? _____

- a.** Calculate volume of medication to withdraw from the vial.

(Formula setup) $250 \text{ mg} : 1 \text{ mL} :: 450 \text{ mg} : x \text{ mL}$

$$250x = 450$$

$$x = \frac{450}{250}$$

$$x = 1.8 \text{ mL}$$

Therefore the nurse would withdraw 1.8 mL from the vial to administer 450 mg of Ancef.

- b.** Calculate the volume of IV solution to provide the recommended final concentration.

The formula:
$$\text{Ordered dose} \times \frac{1 \text{ mL}}{\text{Recommended concentration}} = x \text{ mL}$$

(Formula setup)
$$450 \text{ mg} \times \frac{1 \text{ mL}}{50 \text{ mg}} = 9 \text{ mL}$$

Therefore to the 1.8 mL of Ancef, the nurse must add enough IV solution to give a TOTAL of 9 mL.

$$9 \text{ mL} - 1.8 \text{ mL} = 7.2 \text{ mL}$$

1. Add 1.8 mL of Ancef to an empty buretrol.
2. Add 7.2 mL of compatible IV fluid diluent to make a total volume of 9 mL.

$$\begin{array}{r} 1.8 \text{ mL} \\ + 7.2 \text{ mL} \\ \hline 9.0 \text{ mL} \end{array}$$

Final concentration: 50 mg/mL

- c. Calculate the milliliters per hour to program the IV pump.

(Formula setup)
$$\frac{9 \text{ mL}}{0.25 \text{ h}} = 36 \text{ mL/h}$$

Therefore the nurse would program the IV pump for 36 mL/h to infuse the Ancef over 15 minutes.

EXAMPLE 2: A child weighing 30 kg has an order for nafcillin 850 mg IVPB q6 h over 10 minutes. The nafcillin vial gives a concentration of 250 mg/mL. The recommended infusion concentration of nafcillin is 100 mg/mL. How many milliliters of medication will provide 850 mg of nafcillin? _____ How many milliliters of IV solution need to be added to the medication to equal the recommended final concentration? _____ How many drops per minute should the IVPB be programmed for? _____

- a. Calculate the volume of medication to withdraw from the vial.

(Formula setup)
$$250 \text{ mg} : 1 \text{ mL} :: 850 \text{ mg} : x \text{ mL}$$

$$250x = 850$$

$$x = \frac{850}{250}$$

$$x = 3.4 \text{ mL}$$

Therefore the nurse will withdraw 3.4 mL from the vial to administer 850 mg of nafcillin.

- b. Calculate the volume of IV solution to provide the recommended final concentration.

(Formula setup)
$$850 \text{ mg} \times \frac{1 \text{ mL}}{100 \text{ mg}} = 8.5 \text{ mL}$$

Therefore to the 3.4 mL of nafcillin, the nurse must add IV solution to give a TOTAL of 8.5 mL.

$$8.5 \text{ mL} - 3.4 \text{ mL} = 5.1 \text{ mL}$$

Therefore the nurse will add an additional 5.1 mL of IV solution to the 3.4 mL of nafcillin to give a total of 8.5 mL.

- c. Calculate gtt/min (a buretrol or soluset has a drop factor of 60 gtt/mL).

$$\text{(Formula setup)} \quad \frac{8.5 \text{ mL}}{10 \text{ min}} \times 60 \text{ gtt/mL} = x \text{ gtt/min}$$

$$\frac{510}{10} = x \text{ gtt/min}$$

$$x = 51 \text{ gtt/min}$$

CALCULATION OF DAILY FLUID REQUIREMENTS FOR THE PEDIATRIC PATIENT

Maintenance fluids are those fluids needed daily for bodily function. Overhydration or dehydration (underhydration) can pose a great danger to the infant or young child. Therefore understanding daily fluid requirements is essential for the pediatric nurse. Use the formula below to calculate daily requirements.

PEDIATRIC FLUID REQUIREMENTS

Patient weight	Maintenance fluid requirements in 24 hours
0-10 kg	100 mL/kg/24 h
10-20 kg	1000 mL + 50 mL/kg (for every kg >10 kg)
>20 kg	1500 mL + 20 mL/kg (for every kg >20 kg)

Modified from Hockenberry MJ, Wilson D, Winkelstein ML: *Wong's essentials of pediatric nursing*, ed 7, St Louis, 2005, Mosby, p 841.

To calculate the milliliters per hour, as when the patient receives IV fluids, simply divide the calculated amount of fluids required in 24 hours by 24 to obtain the amount of fluids needed per hour (see formula in Example 1).

EXAMPLE 1: An infant weighs 20 pounds. Calculate the hourly IV fluid rate for this infant.

- Weight 20 lb = 9.1 kg
- Calculation $9.1 \text{ kg} \times 100 \text{ mL/kg/24 h} = 910 \text{ mL/24 h}$
- Daily fluid requirement 910 mL/24 h
- IV fluid formula:

$$\frac{\text{Total volume to be infused}}{\text{Total time for infusion in hours}} = x \text{ mL/h}$$

- Calculation $\frac{910 \text{ mL}}{24 \text{ h}} = 37.9 \text{ mL/h}$
- Fluids per hour 37.9 mL/h

EXAMPLE 2: A child weighs 19.3 kg. Calculate the hourly IV fluid rate for this child.

- Weight 19.3 kg
- Calculation
First 10 kg = 1000 mL
Remaining 9.3 kg $\times 50 \text{ mL/kg} = 465 \text{ mL}$
 $1000 \text{ mL} + 465 \text{ mL} = 1465 \text{ mL/24 h}$
- Daily fluid requirement 1465 mL/24 h
- IV fluid formula $\frac{1465 \text{ mL}}{24 \text{ h}} = 61$
- Fluid per hour 61 mL/hr

NOTE: These rules apply to infants and young children.

Fluid requirements are 2000 to 3000 mL/24 h for the adult and for the child who approaches adult weight. Never exceed adult fluid requirements in a 24-hour period.

BODY SURFACE AREA CALCULATIONS

Body surface area (BSA) is determined by using a child's height and weight along with the West nomogram. If the child has a normal height and weight for his or her age, the BSA may be ascertained by the weight alone. For example, in Figure 18-2 showing the West nomogram, you can see that a child who weighs 70 lb has a BSA of 1.10 m².

When using the West nomogram, take a few minutes to assess the markings of each column. Note that the markings are not at the same intervals throughout each column.

If the child is not of normal height and weight for his or her age, an extended use of the nomogram is required. The far right column is for weight measured in pounds and kilograms. The far left column is for height measured in centimeters and inches. Place a ruler on the nomogram and draw a line connecting the height and weight points. Where the line crosses the surface area (SA) column, the SA in square meters (m²) will be indicated.

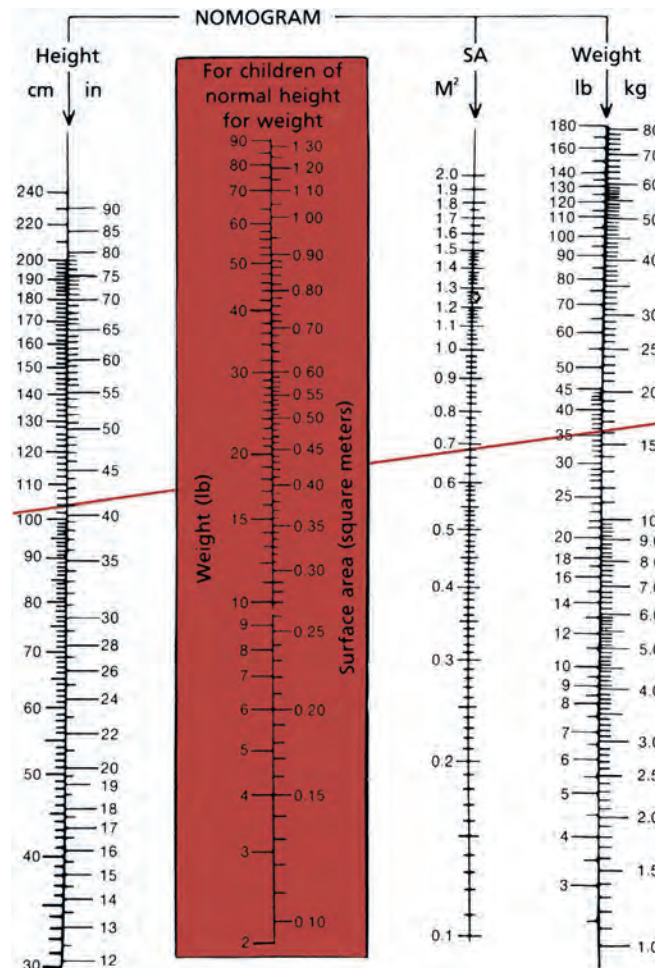


FIGURE 18-2 West nomogram for estimation of body surface areas in children. A straight line is drawn between height and weight. The point where the line crosses the surface area (SA) column is the estimated body surface. (From Kliegman RM, Behrman RE, Jenson HB, Stanton BF, editors: *Nelson textbook of pediatrics*, ed 18, Philadelphia, 2007, Saunders.)

Practice Problems. Using the West nomogram, state the BSA in square meters for each child of normal height and weight listed below:

1. Child weighs 22 lb. BSA = _____
2. Child weighs 4 lb. BSA = _____
3. Child weighs 75 lb. BSA = _____
4. Child weighs 10 lb. BSA = _____
5. Child weighs 32 lb. BSA = _____

Answers

1. 0.46 m²
2. 0.15 m²
3. 1.15 m²
4. 0.27 m²
5. 0.62 m²

Calculation of Dosage Based on Body Surface Area

The calculation of dosage may be based on BSA. The BSA method provides a means of converting an adult dosage to a safe pediatric dosage. There are three steps to the calculation with this method.

1. Determine the child's weight in kilograms.
2. Calculate the BSA in square meters. The formula for this calculation is as follows:

$$\frac{4 W (\text{Child's weight in kilograms}) + 7}{W (\text{Child's weight in kilograms}) + 90} = \text{BSA in square meters}$$

3. Calculate the pediatric dosage using the following formula. The formula is based on the premise that an adult who weighs 140 lb has a BSA of 1.7 m².

$$\frac{\text{BSA in square meters}}{1.7} \times \text{Adult dose} = \text{Child's dose}$$

EXAMPLE: The child weighs 24 lb and the adult dose is 100 mg.

- a. First, convert the child's weight to kilograms.

$$2.2 \text{ lb} : 1 \text{ kg} :: 24 \text{ lb} : x \text{ kg}$$

$$2.2 : 1 :: 24 : x$$

$$2.2x = 24$$

$$x = 10.9 \text{ kg}$$

The child weighs approximately 10.9 kg.

- b. Next, calculate the child's BSA in m².

$$\frac{4(10.9) + 7}{10.9 + 90} = \frac{43.6 + 7}{10.9 + 90} = \frac{50.6}{100.9} = 0.5$$

$$\text{Child's BSA} = 0.5 \text{ m}^2$$

- c. Finally, calculate the appropriate dosage for this child.

$$\frac{0.5}{1.7} \times 100 = 29.4 \text{ mg}$$



Practice Problems. Calculate the following children's dosages.

1. Child weighs 40 lb, adult dose = 300 mg. Child's dose = _____
2. Child weighs 65 lb, adult dose = 30 mL. Child's dose = _____
3. Child weighs 20 lb, adult dose = 50 mg. Child's dose = _____
4. Child weighs 90 lb, adult dose = 10 mL. Child's dose = _____
5. Child weighs 14 lb, adult dose = 2 g. Child's dose = _____

Answers

1. 132 mg
2. 18.5 mL
3. 13 mg
4. 7.65 mL
5. 0.4 g

Practice Problems. Using the West nomogram, calculate the BSA for each child with the following heights and weights:

1. Child weighs 6 kg, height is 110 cm. BSA = _____
2. Child weighs 5 lb, height is 19 in. BSA = _____
3. Child weighs 25 kg, height is 70 cm. BSA = _____
4. Child weighs 30 lb, height is 90 cm. BSA = _____
5. Child weighs 160 lb, height is 200 cm. BSA = _____

Answers

1. 0.41 m²
2. 0.18 m²
3. 0.74 m²
4. 0.58 m²
5. 2.0 m²

Complete the following work sheet, which provides for extensive practice in the calculation of pediatric dosages. Check your answers. If you have difficulties, go back and review the necessary material. When you feel ready to evaluate your learning, take the first posttest. Check your answers. An acceptable score as indicated on the posttest signifies that you have successfully completed this chapter. An unacceptable score signifies a need for further study before taking the second posttest.



WORK SHEET

DIRECTIONS: The medication order is listed at the beginning of each problem. Calculate the child's weight in kilograms, determine the safe recommended dosage or range, determine the safety of the order, and calculate the drug dose. Show your work.


- The physician orders Keflex 250 mg po four times a day for a child weighing 50 lb. You have Keflex 250-mg capsules. The recommended daily po dosage for a child is 25 to 50 mg/kg/day in divided doses q6 h. a. Child's weight is _____ kg. b. What is the safe recommended dosage or range for this child? _____ c. Is the order safe? _____ d. If yes, how many capsules will you administer? _____



- The physician orders Lanoxin 12.5 mg po daily for an infant weighing 6 lb 8 oz. You have Lanoxin 0.05 mg/mL. The recommended daily dosage for an infant is 0.035 to 0.06 mg/kg/day in divided doses two times a day. a. Child's weight is _____ kg. b. What is the safe recommended dosage or range for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters will you administer? _____

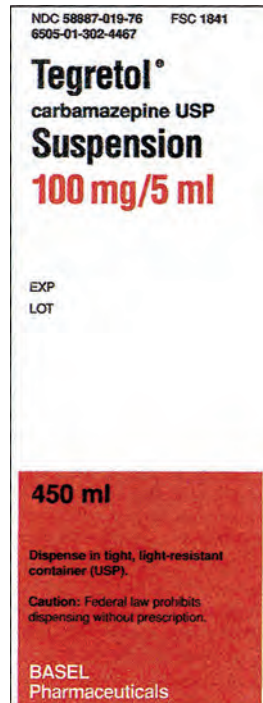


3. The physician orders Benadryl 25 mg IV q6 h for a child weighing 50 lb. You have available Benadryl 12.5 mg/mL. The recommended daily dosage for a child weighing more than 12 kg is 5 mg/kg/24 h in four divided doses. a. Child's weight is _____ kg. b. What is the safe recommended single dosage for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters will you prepare? _____
4. Calculate the 24-hour maintenance fluids for a child who weighs 28 lb.
a. _____ b. How many milliliters per hour are needed to program the pump to deliver the maintenance fluids? _____
5. The physician orders Omnicef 70 mg po twice a day for a child weighing 22 lb. The recommended dosage for Omnicef is 14 mg/kg/24 h twice a day for 10 days for skin infections. It is available as 125 mg/5 mL. a. Child's weight is _____ kg. b. Is the order safe? Prove your answer. _____ c. If the dose is S&T, how many milliliters are needed to deliver the ordered dose? _____
6. The physician orders Cipro 300 mg q12 h po for a child weighing 30.3 kg. You have Cipro 250 mg/5 mL. The recommended oral dosage is 20 to 30 mg/kg/24 h q12 h. a. Child's weight is _____ kg. b. What is the S&T 24-hour dosage range for this child? _____ c. What is the single dose range for this child? _____ d. How many milliliters are needed to deliver the ordered dose? _____

- 
7. The physician orders Orapred 45 mg twice a day po for an asthmatic child weighing 94 lb. You have Orapred 15 mg/5 mL. The recommended oral dosage is 0.5 to 2 mg/kg/24 h divided twice a day. Maximum dosage is not to exceed 80 mg/24 h. a. Child's weight is _____ kg. b. What is a safe dosage range for this child? _____ c. Is the order safe? _____ d. Would you administer this medication as dosed? If not, why not?



8. The physician orders Dilantin 60 mg po q12 h for a child weighing 40 lb. You have Dilantin 30-mg chewable tablets available. The recommended oral dosage for a child is 5 to 7 mg/kg/24 h in divided doses q12 h. a. Child's weight is _____ kg. b. What is the safe 24-hour dosage range for this child? _____ c. Is the order safe? _____ d. If yes, how many chewtabs will you administer per dose? _____
9. A child is to receive vancomycin 750 mg IVPB q6 h. The child weighs 68 lb. The recommended dosage of vancomycin is 40 to 60 mg/kg/24 h. a. Child's weight is _____ kg. b. What dose per kilogram per 24 hours is the child receiving? _____ c. Is the order safe? _____
10. The physician orders Amoxil 300 mg po q12 h for a child weighing 42 lb. You have Amoxil 125 mg/5 mL. The recommended oral dosage is 25 to 50 mg/kg/24 h q12 h. a. Child's weight is _____ kg. b. What is the safe single dose range for this child? _____ c. How many milliliters are needed to deliver the ordered dose? _____
11. The physician orders 100 mL D₅W bolus IV to run over 30 minutes to a 3-year-old child. The drop factor of the tubing is 60 gtt/mL (microdrip). How many drops per minute are needed to deliver the bolus of D₅W? _____


12. The physician orders Tegretol 150 mg po three times a day for a child weighing 58 lb. You have Tegretol 100 mg/5 mL. The recommended oral dosage for a child is 10 to 20 mg/kg/24 h divided in doses three times a day. a. Child's weight is _____ kg. b. What is the safe single dose range for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters are needed? _____



13. Calculate the 24-hour maintenance fluid requirements for a child who weighs 72 lb.
a. Child's weight is _____ kg. b. The maintenance fluid requirements are _____.
c. How many milliliters per hour are needed to deliver the maintenance fluids? _____
14. The physician orders ibuprofen 100 mg for a child who weighs 52 lb. Recommended dose for ibuprofen is 5 to 10 mg/kg/dose q6 h. It is available as 100 mg/5 mL. a. Child's weight is _____ kg. b. What is a safe individual dose range for this child? _____ c. How many milliliters are needed to deliver the ordered dose? _____

15. The physician orders Kefzol 350 mg po q6 h for a child weighing 81 lb. You have Kefzol 500 mg/5 mL. The recommended daily oral dosage is 25 to 50 mg/kg/24 h divided q6 h. a. Child's weight is _____ kg. b. What is the safe recommended single dose range for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters will you prepare? _____
16. The physician orders Tagamet 60 mg po q8 h for an infant weighing 16 lb. Tagamet 300 mg/5 mL is available. The recommended daily oral dosage is 15 to 20 mg/kg/24 h divided q8 h. a. Child's weight is _____ kg. b. What is the safe recommended dosage or range for this child? _____ c. Is the order safe? _____ d. How many milligrams per kilogram per 24 hours is the child receiving? _____ e. If the ordered dosage is safe, how many milliliters will you administer? _____
17. The physician orders prednisone 8 mg po q12 h for a child weighing 19 lb. You have prednisone syrup 5 mg/5 mL. The recommended oral dosage is 0.5 to 2 mg/kg/24 h given once daily or divided and given in two doses per day. a. Child's weight is _____ kg. b. What is a safe single dose range for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters will you draw up? _____
18. The physician orders Ancef 400 mg IV q8 h for a child weighing 32 lb. You have Ancef 330 mg/mL. The recommended daily IV dosage for a child is 100 mg/kg/24 h in divided doses q6–8 h. a. Child's weight is _____ kg. b. What is the safe recommended dosage or range for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters will you prepare? _____

EXP.	equivalent to 1 gram cefazolin NDC 0007-3130-16	NSN 6505-01-262-9508 Before reconstitution protect from light and store between 15° and 30°C (59° and 86°F). Usual Adult Dosage: 250 mg to 1 gram every 6 to 8 hours. See accompanying prescribing information. For I.M. administration add 2.5 mL of Sterile Water for Injection. SHAKE WELL. Withdraw entire contents. Provides an approximate volume of 3.0 mL (330 mg/mL). For I.V. administration see accompanying prescribing information. Reconstituted Ancef is stable for 24 hours at room temperature or for 10 days if refrigerated (5°C or 41°F). SmithKline Beecham Pharmaceuticals Philadelphia, PA 19101	  5 0007-3130-16 2
	ANCEF® CEFAZOLIN FOR INJECTION (LYOPHILIZED) Formerly sterile cefazolin sodium (lyophilized)		
LOT	25 Vials for Intramuscular or Intravenous Use K3130-16		

- 
19. The order is to infuse 250 mL of D₅W over 3 hours to an 11-year-old child. How many milliliters per hour should the IV pump be programmed for? _____
20. A 25-kg child has an order for gentamicin 40 mg IVPB twice a day over 20 minutes. The concentration of the vial states 10 mg/mL. The recommended infusion concentration is 2 mg/mL. a. How many milliliters of medication will provide 40 mg of gentamicin? _____
b. How many milliliters of IV solution need to be added to the medication to equal the recommended final concentration? _____ c. How many drops per minute of gentamicin should be infused? _____

ANSWERS ON PP. ●●-●●.

NAME _____

DATE _____

ACCEPTABLE SCORE 44

YOUR SCORE _____



POSTTEST 1



DIRECTIONS: The medication order is listed at the beginning of each problem. Calculate the child's weight in kilograms, determine the S&T dosage or range, determine the safety of the order, and calculate the drug dosage. Show your work.

1. The physician orders phenobarbital 60 mg po q12 h for a child weighing 55 lb. Phenobarbital elixir is available as 20 mg/5 mL. The recommended daily dosage for a child is 4 to 6 mg/kg/24 h divided q12 h. a. Child's weight is _____ kg. b. What is the S&T single dose range for this child? _____ c. Is the order safe? Explain. _____ d. If so, how many milliliters will the nurse administer? _____

NDC 0002-2438-05
16 fl oz (1 pt) (473 mL)

Lilly

**ELIXIR No. 227
PHENOBARBITAL
ELIXIR, USP**

Contains 20 mg Phenobarbital per 5 mL
WARNING—May be habit forming.
Contains Alcohol 14 Percent
CAUTION—Federal (U.S.A.) law prohibits dispensing without prescription.

Keep Tightly Closed
Store at Controlled Room Temperature 59° to 86° F (15° to 30° C)

WV 5931 AMX
Eli Lilly & Company, Indianapolis, IN 46285, U.S.A.
Expiration Date/Control No.

VOID

Usual Adult Sedative Dose—60 mg (1 gr) (3 tea-spoonfuls) two to four times a day.
Indiscriminate use may be harmful.
Dispense in a tight, light-resistant container.

2. The physician orders amoxicillin 500 mg po q6 h for a child weighing 44 lb. Amoxicillin is supplied in 250-mg capsules. The recommended daily oral dosage is 25 to 50 mg/kg/24 h in divided doses q6 h. a. Child's weight is _____ kg. b. What is the S&T single dose range for this child? _____ c. Is the order safe? Explain. _____ d. If the order is safe, how many capsules will the nurse administer? _____

3. The physician orders Keflex 300 mg po q8 h for a child who weighs 34 lb. Keflex is supplied in an oral suspension of 125 mg/5 mL. The recommended daily oral dosage for a child is 50 to 100 mg/kg/24 h divided q8 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the child receiving? _____ c. If the dosage is S&T, how many milliliters will you administer? _____



4. The physician orders morphine sulfate 4 mg IM stat for a child weighing 78 lb. Available is morphine sulfate 15 mg/mL. The recommended intramuscular (IM) dosage for a child is 0.1 to 0.2 mg/kg/dose q2–4 h as needed. a. Child's weight is _____ kg. b. What is the safe recommended dosage or range? _____ c. Is the order safe? Prove. _____ d. If yes, how many milliliters will you administer? _____



5. A child has a fever of 101.5° F orally and needs acetaminophen. Calculate an S&T dosage or range of acetaminophen for this child, who weighs 62 lb. Recommended dosage range for acetaminophen is 10 to 15 mg/kg/dose q4–6 h. It is available as an elixir 160 mg/5 mL. a. Child's weight is _____ kg. b. What is an S&T dosage range for this child? _____ c. How many milliliters are needed for this range? _____

6. The physician orders 1000 mL of 0.9% NS to run over 16 hours. What rate is needed to deliver the ordered fluids? _____

7. The physician orders Biaxin 300 mg po twice a day for a child who weighs 92 lb. Available is Biaxin 125 mg/5 mL. The recommended dosage is 15 mg/kg/24 h divided q12 h.
- Child's weight is _____ kg.
 - What is the S&T dosage for this child? _____
 - Is the order safe? Prove. _____
 - If yes, how many milliliters will you administer? _____



8. A child is to receive IV fluids at maintenance rate. She weighs 25 lbs. a. Child's weight _____ kg. b. Calculate her 24-hour fluid requirements _____ c. How many milliliters per hour are needed to deliver the maintenance fluids? _____
9. A patient is to receive vancomycin 650 mg IVPB q6 h. The patient weighs 96 lb on admission. The recommended dosage is 40 to 60 mg/kg/24 h q6 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the patient receiving? _____ c. Is the written order S&T? Explain. _____
10. The physician orders Ceclor 300 mg po suspension q8 h for treatment of otitis media. Recommended oral dosage for infant and child is 20 to 40 mg/kg/24 h q8 h. Maximum dosage is 2 g/24 h. The patient weighs 95 lb. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the patient receiving? _____ c. Is this an S&T dosage for this patient? Prove. _____

11. A 10-month-old infant has an order for 100 mL of 0.9% NS to be infused over 6 hours. How many milliliters per hour should the IV pump be programmed for? _____
12. An infant weighing 15 kg has an order for ampicillin 400 mg IVPB over 30 minutes. The ampicillin vial gives a concentration of 250 mg/mL. The recommended infusion concentration is 50 mg/mL. a. How many milliliters of the medication will provide 400 mg of ampicillin? _____ b. How many milliliters of IV solution need to be added to the medication to equal the recommended final concentration? _____ c. How many drops per minute of ampicillin should be infused? _____
13. The physician orders 60 mg of prednisone po twice a day for a patient who weighs 30 kg. It is available as 15 mg/5 mL. Recommended dosage is 0.5 to 2 mg/kg/24 h given in one or two doses. Maximum dose is 80 mg/24 h. a. What dose per kilogram per day is the patient receiving? _____ b. Is this an S&T dose? _____ c. Would you administer this medication? If not, why? _____
14. The physician orders Ceclor 400 mg po q12 h for a child who weighs 89 lb. Ceclor is available as 375 mg/5 mL. The recommended dosage is 15 to 20 mg/kg/24 h divided q12 h. a. Child's weight is _____ kg. b. What is the safe recommended dosage for this child? _____ c. Is the order S&T? _____ d. If so, how many milliliters will you administer? _____



15. Nafcillin 90 mg q6 h IV is ordered for a child who weighs 11 lbs. The recommended IM/IV dosage is 50 to 100 mg/kg/24 h q6 h for mild to moderate infections and 100 to 200 mg/kg/24 h q4–6 h for severe infections. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the patient receiving? _____ c. Is the order S&T? _____

ANSWERS ON PP. ●●–●●.

NAME _____

DATE _____

ACCEPTABLE SCORE 49

YOUR SCORE _____



POSTTEST 2



DIRECTIONS: The medication order is listed at the beginning of each problem. Calculate the child's weight in kilograms, determine the S&T dosage or range, determine the safety of the order, and calculate the drug dosage. Show your work.

1. A child is to receive vancomycin 450 mg IVPB q6 h. The patient weighs 70 lb on admission. The recommended dosage is 40 to 60 mg/kg/24 h q6 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the patient receiving? _____ c. Is the order S&T? Prove. _____

2. The physician orders Dilantin 100 mg po q12 h for a child weighing 62 lb. You have Dilantin 125/5 mL on hand. The recommended daily oral dosage for a child is 7 to 8 mg/kg/24 h in divided doses two or three times per day. a. Child's weight is _____ kg. b. What is a safe 24-hour dosage range for this child? _____ c. What is the single dose range for this child? _____ d. Is the prescribed dose safe to administer? _____ e. If yes, how many milliliters will you administer? _____

N 0071-2214-20 **Shake Well**

Dilantin-125[®]

(Phenytoin Oral Suspension, USP)

125 mg per 5 mL potency

Important—Another strength available; verify unspecified prescriptions.

Caution—Federal law prohibits dispensing without prescription.

8 fl oz (237 mL)

PARKE-DAVIS
Div of Warner-Lambert Co/Morris Plains, NJ 07950 USA **2214G013**

Shake well before using.
Each 5 mL contains phenytoin, 125 mg with a maximum alcohol content not greater than 0.6 percent.

Usual Dose—Adults, 1 teaspoonful three times daily; Children, see package insert.

See package insert for complete prescribing information.

Store below 30° C (86° F). Protect from freezing.

Keep this and all drugs out of the reach of children.

Exp date and lot

6505-00-890-1110

3. The physician orders Amoxil 400 mg po q12 h for a child weighing 58 lb. You have Amoxil suspension 250 mg/5 mL. The recommended daily oral dosage for a child is 25 to 50 mg/kg/24 h in divided doses q12 h. a. Child's weight is _____ kg. b. What is the safe 24-hour dosage range for this child? _____ c. What is the single dose range for this child? _____ d. How many milligrams per kilogram per 24 hours is the patient receiving with this order? _____ e. How many milliliters are needed to deliver the ordered dose? _____



4. The physician orders Keflex 500 mg po q6 h for a 99-lb school-age child. Available is Keflex 250-mg capsules. The recommended daily oral dosage is 50 to 100 mg/kg/24 h divided q6 h. Maximum dosage is not to exceed 2 g/24 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is this child receiving? _____ c. Is the order safe? _____ d. If yes, how many capsules will you administer? _____



5. The physician orders Omnicef 200 mg po q12 h for a child weighing 66 lb. Omnicef is available as 125 mg/5 mL. Recommended dosage is 14 mg/kg/24 h divided q12 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the child receiving? _____ c. Is the order safe? _____ d. If yes, how many milliliters are needed? _____

6. A neonate weighs 2012 g. He is to receive ampicillin 100 to 200 mg/kg/24 h divided q6 h IV per syringe for otitis media. a. Child's weight is _____ kg. b. What 24-hour dosage range is needed? _____ c. What single dose range is needed? _____
7. The physician orders Amoxil 180 mg po q8 h for a 35-lb child. Available is Amoxil 125 mg/5 mL. Recommended dosage is 25 to 50 mg/kg/24 h divided q6–8 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the child receiving? _____ c. Is the order safe? _____ d. If yes, how many milliliters are needed? _____



8. An infant is to receive 150 mL of whole blood over 3 hours. Using a microdrip (60 gtt/mL), how many drops per minute are needed? _____
9. The physician orders vancomycin 330 mg po q6 h for a 74-lb child. You have vancomycin 250 mg/5 mL. The recommended daily oral dosage is 40 mg/kg/24 h divided q6 h. a. Child's weight is _____ kg. b. How many milligrams per kilogram per 24 hours is the child receiving? _____ c. Is the order safe? _____ d. If yes, how many milliliters are needed? _____

10. The physician orders morphine sulfate 0.9 mg IV q4 h for pain. Available is morphine sulfate 0.5 mg/mL. The child weighs 20 lb. The recommended single dose is 0.1 to 0.2 mg/kg q4 h.
- Child's weight is _____ kg.
 - What is the safe dose range for this child? _____
 - Is the order safe? _____
 - If yes, how many milliliters will you draw up? _____
11. The physician orders an infusion of 200 mL of D₅LR over 3 hours to a 6-year-old child. How many milliliters per hour should the IV pump be programmed for? _____
12. A 60-kg child has an order for vancomycin 500 mg IVPB to be delivered over a 1- to 2-hour period. The vial concentration is 50 mg/mL. The recommended infusion concentration is 5 mg/mL.
- How many milliliters of medication will provide 500 mg of vancomycin? _____
 - How many milliliters of IV solution need to be added to the medication to equal the recommended concentration? _____
 - How many drops per minute of vancomycin should be infused? _____
13. The physician orders Lanoxin 0.013 mg po twice a day for an infant weighing 3036 g. The recommended oral dosage for Lanoxin is 6 to 10 mcg/kg/24 h divided q12 h. Available is Lanoxin elixir 50 mcg/mL.
- Child's weight is _____ kg.
 - What is an S&T 24-hour dosage range for this infant? _____
 - What is a safe single dose range for this infant? _____
 - Is the order safe? _____
 - If yes, how many milliliters will you give? _____



14. Calculate the single dose range of acetaminophen for an infant who weighs 9 lb. Acetaminophen is available as 80 mg/0.8 mL, and the safe dose range is 10 to 15 mg/kg/dose q6 h. a. Infant's weight is _____ kg. b. What is the single dose range? _____ c. How many milliliters are needed to deliver the calculated dose range? _____
15. Phenobarbital elixir 72 mg po daily is ordered for a child who weighs 37 lbs. Phenobarbital is supplied as 20 mg/5 mL. Recommended dosage is 4 to 6 mg/kg/24 h one or two times per day. a. Child's weight is _____ kg. b. What is the 24-hour dosage range needed for this child? _____ c. Is the order safe? _____ d. If yes, how many milliliters will you administer? _____

ANSWERS ON PP. ●●●-●●●.

evolve For additional practice problems, refer to the Pediatric Calculations Section of *Drug Calculations Companion*, Version 4, on Evolve.

