



Calculations of doses: Patient parameters/ body surface and chemotherapy doses
(Chapter 8)

Objectives:

The students should be able to

- Calculate the dose for a patient based on weight and body surface area (BSA)
- Calculate the BSA for a child and adult
- Calculate the dose for Chemotherapeutic agents

Reading

Pages 123-139

You need to know the following for the iRAT

Why do we need to adjust the pediatric and geriatric dose compared to an adult?

When do we calculate the dose based on the BSA?

What are the different ways to calculate the BSA?

How many doses of each drug does the following Rx require?

Cyclophosphamide 100mg/m² D 1- 14

Methotrexate 40mg/m² D 2, 8

These notes should help you understand the concepts in the book in a simple way

Dose calculation:

1-Based on age

Children (birth –adolescence)

Geriatrics >65 years

Why do they have different dose ranges?

Children, adults and elderly patients have

Different Excretion, distribution, metabolism

Impaired / undeveloped functions.

Fat to total body weight ratio (more details are in your book)

Pediatrics should never be treated as little adults.

OTC drugs: most medications divide pediatrics dosing based on 3 groups: 2-6 years, 6-12 years, and >12 years.

There are some rules, based on **age**, (Young's, Cowlings, and Fried's) that have been used to calculate medication dose based on age.

Age alone is no longer considered valid criterion for determination of dose.

2-Based on weight

For adult (Average weight 70 kg, or 150 lb)

For kids:

Dose table is used for some drugs' dose calculation.

Clark's rule to calculate dose based on weight

Dose calculation

For potent drugs dose may be based on **both age and weight**.

Pediatric Digoxin dose based on age and weight

Age	µg/kg
Premature	15- 25
Full term	20-30
1- 24 months	30-50
2-5 years	25-35
5- 10 years	15-30
Over 10 years	8-12

Problem

Calculate the digoxin dose (in mL) of
3 months old, 15 lb child ,

2.5 years old 30 lb child?

Digoxin Oral Solution USP, 50 mcg (0.05 mg) /mL

Problem

How many milliliters of acetaminophen elixir would a 22 lb child need? The recommended dose is 10 mg/kg and the available concentration is 100 mg/ half tsp.

1 tsp

0.5 tsp

0.2 tsp

None of the above

3-Based on BSA

The dose based on BSA is mainly for children and for chemotherapy treatment. It requires 2 steps: determination of the BSA, then dose calculation

I. Determination of BSA can be done: using the equation or nomogram.

1- equation:

$$BSA(m^2) = \frac{\sqrt{height(cm) \times weight(kg)}}{60}$$

2- Based on nomogram

Remember: the kids nomograms are different from the adults' one.

II. Calculate the child dose from an adult dose based on BSA:

$$\text{Child dose} = \frac{BSA(m^2) \times \text{usual Adult dose}}{1.73m^2}$$

If the drug dose is indicated per m^2 , then use simple proportions.

Example: Drug A is given as 50 mg/ m^2 , a patient with $BSA = 0.9 m^2$. What would be the needed dose?

Example The doctor has ordered an antibiotic with average adult dose of 500 mg per day. Calculate the dose for a child who is 100cm, 25 kg based on BSA.

Use both methods to determine the BSA.

Few important points

Correct conversions: from lb to kg, and from inches to centimeters are crucial.

The adult BSA is usually 1.4 to 2.4 m^2 (rounded to the nearest tenth), while the children older than 3 months are 0.27-1.35 m^2 , newborns are equal or less than 0.22 m^2 (rounded to the nearest hundredth).

BSA problem

Calculate the dose of a drug for a 40 lb, 32 inches child, with usual pediatric dose of 150 mg/ m^2 . Use both methods of calculating BSA.

BSA problem

What would be the correct dose for a child who is 66 lb, 3 ft. of a drug with an adult dose of 450 mg? What about if the child dose is 450 mg/m^2 ?

Problem

Calculate the dose in mL of vincristine for a 6 years old, 40 lb, 4 feet child with leukemia. The child dose is 2 mg/m^2 and the drug concentration is 1 mg/mL .

- 1 mg
- 0.8 mg
- 1.6 mg
- 1.85 mg
- 2 mg