What are the pharmacist's responsibilities on a prescription?

Pharmacist must dispense the medication properly, give the necessary information to the patient and be sure of patient compliance and safety.

Thus when a prescription comes, you must;

- Check the appropriateness of the prescription
- Check the usual and maximum doses
- Check the possible drug interactions
- Check the repeatability of the prescription

- Pharmacist must check the doctor's and patient's information;

✓ Age and diagnosis of the patient must be available. These information are especially important for checking the dose.

✓ There must be address, protocol number and signature of the doctor (you should need to consult with the doctor).

- **Pharmacist must check the dosage form, strength and total amount to be dispensed.**

✓ The drug can have more than one available dosage form or strength, so the pharmacist must check their correctness.

✓ If there is a mistake or lack in the prescription, the pharmacist must contact with the doctor. Generally, strength or dose can be written wrongly or doctor can forget to sign the prescription.

- **Pharmacist must check the possible drug interactions**

✓ A potential drug - drug interaction or drug - food interaction must be consulted with the prescriber.

- **Pharmacist should check if the prescription is on a repeat basis.**

✓ Repeats are stated on the prescription as defined time intervals or a defined number of occasions. After the final repeat being dispended, the pharmacist should retain the prescription.

Pharmacist must also;

- Check the amounts; are they suitable to weigh or measure?
- Check the suitability of preparation method and the packaging
- Check the labelling and the directions to the patient

HOW CAN WE MINIMIZE PRESCRIPTION ERRORS

- It should be confirmed that the prescription is correct and complete.
- A prescriber or pharmacist must be aware of look-alike, soundalike drugs.
- Extra attention should be shown to zeros and abbreviations.
- Workplace must be organized.
- Distraction should be reduced.
- Focus must be given on reducing stress and balancing heavy workloads.
- Drugs should be stored properly taking adequate time.
- All prescriptions should be checked thoroughly.
- Extensive patient counseling should be provided.

Caution!

- **Are the fill instructions clear and reasonable?**
  - *Is it q.i.d. or q.d; 4 ml or 0.4 ml.*
- **Are the administration directions clear?**
  - *Are these the same? "Take two tablets daily" vs. "Take one tablet twice daily" vs. "Take two tablets once daily."*
- **Are there look-alike names?**
  - *Is it Metadate® 10 mg or Methadone 10 mg; Lamictal® or Lamisil®?*

Caution!

- **Don’t add information!**
  - *Never add information based on what you assume the prescriber meant. The prescriber has the knowledge of the patient’s condition that you don’t have.*

- **Check against the original!**
  - *During the fill process, always refer to the original prescription first and then refer to the label.*

Label Preparation

- The name, address, and telephone number of the pharmacy.
- A prescription number.
- The date dispensed.
- The name of the patient.
- Directions for use.
- The medication dispensed.
- Expiration date of the medication.
- The name of the prescriber.
- The pharmacist initials.
- Refill information.

DOSE

Dose is the amount of drug taken at once.

When we check a prescription we must be sure that there is not any exceeding dose. Thus, we must both check single and daily maximum doses for the drugs.

- **Usual dose**

This is the dose given in pharmacopoeias.

It changes according to the treatment.

- **Maximum dose**

This is the dose which can be given without causing toxic effects.

It is defined in Turkish Pharmacopoeia as “the dose which is taken orally by adults at any one time or daily and must not be exceeded unless indicated otherwise by the doctor”

Example from TF 1974

Drug	Application	Usual doses		Maximum doses	
		Single dose	24 hour	Single dose	24 hour
Acetyl salicylic acid	Per os or rectal	0.30- 0.50 or up to 1g	1- 5 g	1g	8 g

Example:

Rx

Paracetamol ..... 0.8 g
Aspirin .....0.1 g

p. 1 cachet No: XX
S : 3x1 Daily p.c.

According to this prescription; The patient will take this medicine after food and three times daily, which means patient will take 0.8 g of paracetamol each time.

If the pharmacist check the prescription, he/she will see that the maximum dose for paracetamol is 0.65 g and the prescription exceeds this dose.

Approximate Measures

- Generally pharmaceutical manufacturers use 5mL measure (teaspoonful) as a basis of liquid formulations.

Household measure	Volume (mL)
Teaspoonful	5
Dessertspoonful	10
Tablespoonful	15
Teacupful	120
Tumblerful	150-240

- Standard dropper can also be used as an approximate measure, especially for aromatic solutions.

Doses with household measures

- Liquid dosage forms such as syrups, potions are generally given as weight/volume.
- This kind of medicine are preferably applied with measuring cups given with the medicine. If it is not available, patient can use household measures.
- Teaspoonful is the basic measure here.

Rx

Phosphate de codeine ..... 1 g
Eau distilleé..... 10 mL
Sirop de menthe .....q.s..... **110 g**
S : 3x1 dessertspoon

(Single maximum dose : 0.1 g)
(Daily maximum dose: 0.3 g)
1 dessertpoonful is 10 mL

- **You must convert 10 mL to weight by using the density of the formulation.**
- **Assume that the weight is found as 13 g from the density.**

110 g 1 g
13 g x

---

x = 13 / 110 = 0.118 g

0.118 g x 3 = 0.354 g

Rx

Bismuth subnitrate..... 2 g

Belladone tincture.....

Simple syrup ..... aa 10 g

Lime tree infusion.....ad..... 100 ml

S : 3x1 tablespoonful daily

(single maximum dose: 1 g)

(Daily maximum dose: 3 g)

- 1 tablespoonful is 15 mL
- aa 10 g means «take 10 g each»
- ad means «complete to»

100 mL 10 g

15 mL x

x = 1.5 g

1.5 x 3 = 4.5 g

Standard dropper

It consist of a tube of glass that is generally fitted with a collapsible bulb and a delivery end to a round hole/nozzle having an external diameter of 3 mm.

When drops are specified on a prescription usually a dropper (eyedropper) has been employed.

The volume errors in measuring liquids with a dropper must not exceed 15%.

According to EP 6.0

«20 drops of water at 20 ±1°C flowing freely from the dropper held in the vertical position at a constant rate of 1 drop/sec weighs 1 g.»

Reconstitution and «Unit» Dose

Some drugs are not chemically stable in solution form, so they are supplied as dry powders for reconstitution just before use.

Many of these are antibiotics such as penicillin, vitamins, and chemotherapeutics.

For example, an oral antibiotic for reconstitution comes as a powder in a bottle with sufficient space to add water. The powder itself will remain stable up to shelf life when it is in dry form. However, when reconstituted, its shelf life will be 10-14 days.

If the formulation is for injection, powder must be steril and steril injectable water must be used for reconstitution under aceptic conditions. The formulation must be used within hours of reconstitution.

Unit (IU: International Unit) is a certain quantity of the biological activity of the drug. Drug doses such as vitamins, hormones, and antibiotics can be stated as units.

	IU amount equivalent to 1 mg	Amount equivalent to 1 IU
Penicillin	1670	0.000598 mg
Streptomycin sulphate	780	0.0001282 mg
İnsulin	23.99	0.04167 mg
Digitoxin	273.97	3.65 µg

Example;

350 000 IU penicillin G is needed for reconstitution. If the pharmacist have a stock amount of 500 000 IU penicillin G, how much he/she must take from this stock?

1) You can calculate the amount you need converting IU to mg.

Assume that you weighed 500000 IU as 0.300 g. Then,

(350 000 /500 000) x 0.300 = 0.210 g

If you weigh 201 mg from your stock and reconstitute it to a final volume, you will obtain 350 000 IU penicillin G.

2) You can calculate the amount you need converting IU to mL.

Assume that when reconstituted final volume of 500000 IU Peniciilin G is measured as 10 mL. Then,

350 000/500 000 x 10 = 7 ml

If you reconstitute the powder to 10 mL and take 7 mL of this formulation you will provide 350 000 IU Penicillin G.

Children and infant doses

Children often require different doses from those of adults.

Amongst the given equations, BSA (body surface area) method is believed to be the best, as the correct dosage of drugs seems more nearly proportional to the surface area. However, if the information is not available other rules can also be used. These are;

1- Young's rule
Age basis (more than 1 and up to 12 years old)

2- Cowling's rule
Age basis (more than 1 years old)

3- Fried's rule
Age basis (for infants up to 12 months old)

4- Clark's rule
Body weight basis

5- Body surface area method (BSA)
Depends on body weight and height

Young's rule

Children dose = (Age (in years)/ Age +12) x Adult dose

This equation is suitable for children up to 12 years old

If the adult dose of a drug is 5 mg, what is the dose for a 8 years of old child?

C.D.= (8 / 8 + 12) x 5 mg
= 2 mg

If the adult dose of a drug is 15 mL, what is the dose for a 8 years of old child?

C.D.= (8 / 8 + 12) x 15 mL
= 6 mL

Cowling's rule

Children dose = (Age +1 (in years) /24) x Adult dose

If the adult dose of a drug is 5 mg, what is the dose for a 8 years of old child?

C.D.= (8+1 /24) x 5 mg
= 1.875 mg

Fried's rule

Children dose = (Age (in months)/150) x Adult dose

This equation is suitable for infants.

If the adult dose of a drug is 5 mg, what is the dose for a 1 years of old child?

C.D.= (12/150) x 5 mg
= 0.400 mg

Clark's rule

Children dose = Weight (in pound)/150 x Adult dose

In metric system we can convert as;

Children dose = (Weight (in kg)/65) x Adult dose

This equation is based on weight. 65 kg is assumed as the weight of a healthy adult man.

If the adult dose of a drug is 5 mg, what is the dose for a 6 kg weighed child?

C.D.= (6/65) x 5 mg
= 0.460 mg

BSA (Body Surface Area) method

Children dose = (Children BSA/1.73) x Adult dose

This equation can be applied with the help of a diagram called as «West Nomogramme».

BSA method is preferably used in hospitals and for the drugs with narrow therapeutical index, because of its accuracy.

It can also be calculated with the equation given below:

BSA (m^2) = weight $^{0.475}$(kg)x height $^{0.725}$ (cm) x 0.007184

1.73 cm^2 is an assumed amount for Adult BSA

It is the body surface area of a man with 180 cm height and 70 kg weighed.

Note that in some reference books this value is given as 1.87 cm^2

Some children BSA:

Infant (new born) = 3.5 kg, 0.25 m^2
Infant (2 years old) = 12 kg, 0.50 m^2
Child of 9 years old = 30 kg, 1 m^2

Example:

If the daily adult dose for an antibiotic is 50 mg, what will be the dose for a child with 81 cm and 5kg?

- BSA for child is = 0.35
- BSA for adult is =1.87

C.D.= (0.35 / 1.87) x 50
= 9.36 mg

West Nomogramme

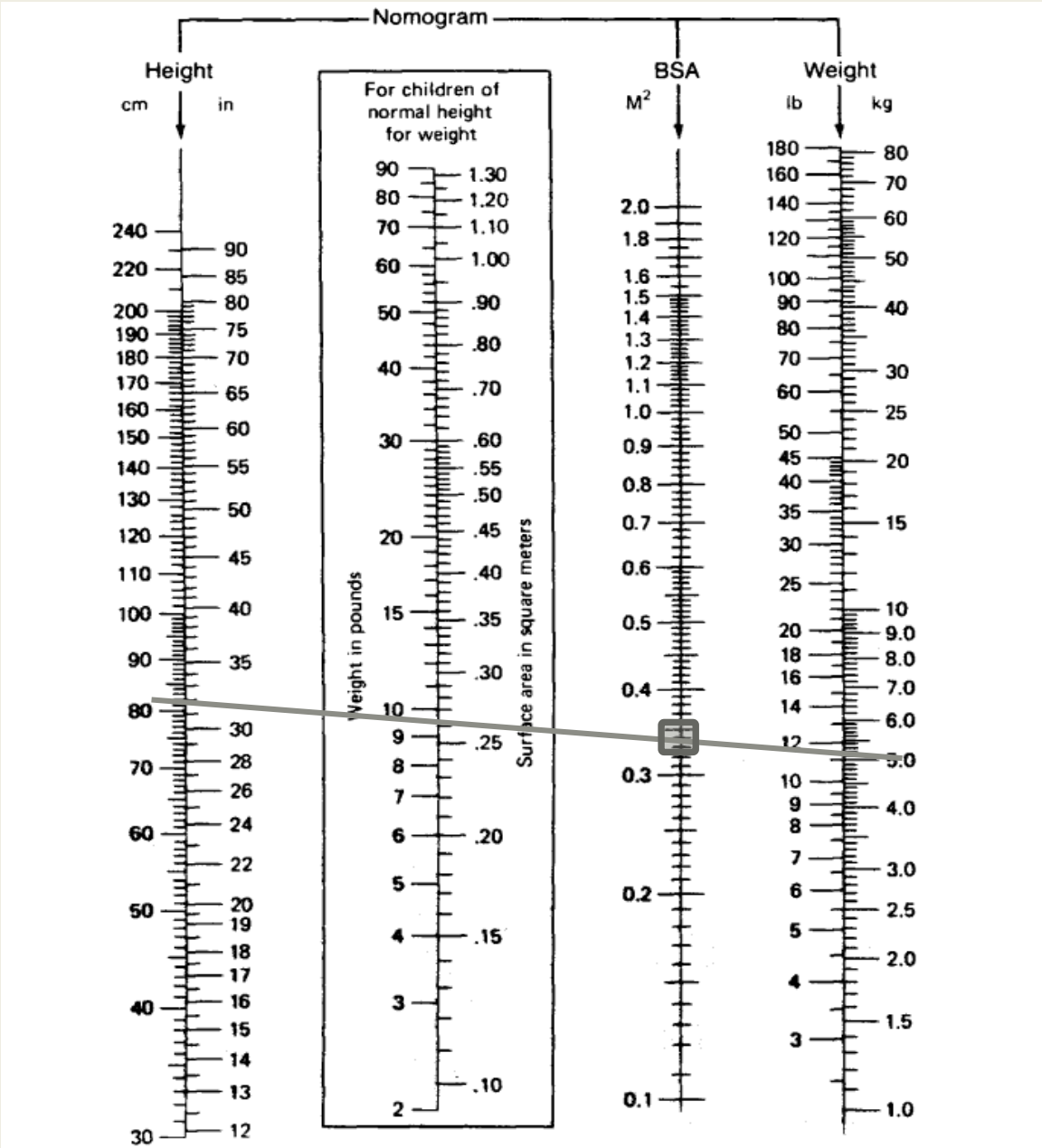

Figure 3–1. West Nomogram (for Estimation of BSA). The BSA is indicated where a straight line connecting the height and weight intersects the BSA column or, if the patient is roughly of normal proportion, from the weight alone (enclosed area). (Nomogram modified from data of E. Boyd by C. D. West; from Vaughan, V. C., and R. J. McKay, eds., *Nelson Textbook of Pediatrics*, 12th ed., Philadelphia: Saunders, 1983.)