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Competency-based Practical Manual of PHARMACOLOGY

As per the Revised Competency-based Medical Education Curriculum (NMC)



Apurva Agrawal
Harcharan Singh

2nd Edition

JAYPEE

Contents

Sl. No.	*Topic*	*Competency*	*Competency No. (No. required to certificate)*	*Page No.*	*Signature faculty*
1.	Drug Nomenclature	Describe nomenclature of drugs, i.e., generic, branded drugs and scheduled drugs, explaining the utility of the nomenclature, cost effectiveness and use.	PH 1.3	1	
2.	Sources of Drug Information	Compare and contrast different sources of drug information and update on latest information on drugs.	*PH 10.1 **Certifiable (2)**	7	
3.	Solid Dosage Forms	Identify the common drug formulations and drug delivery systems, demonstrate their use and describe their advantages and disadvantages. Describe various routes of drug administration, their advantages and disadvantages and demonstrate administration of, e.g., SC, IV, IM, SL, rectal, spinal, sublingual, intranasal sprays and inhalers.	*PH 1.4 **Certifiable (1)** *PH 1.5 **Certifiable (2)**	11	
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Sl. No.	*Topic*	*Competency*	*Competency No. (No. required to certificate)*	*Page No.*	*Signature faculty*
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18.	Communication with Patients	Communicate with the patient regarding optimal use of a drug therapy using empathy and professionalism, e.g.,oral contraceptives, anti-TB drugs, etc. Describe methods to improve adherence to treatment and motivate patients with chronic diseases to adhere to the prescribed pharmacotherapy.	PH 10.14 *PH 10.15 **Certifiable (2)**	155	
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* Certifiable Competencies (Total 11 competencies are certifiable)

CHAPTER

3

Solid Dosage Forms

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COMPETENCIES

PH1.4: Identify the common drug formulations and drug delivery systems, demonstrate their use and describe their advantages and disadvantages.
PH1.5: Describe various routes of drug administration, their advantages and disadvantages and demonstrate administration.

DOSAGE FORM

Dosage form is the physical form in which any drug is available for administration.

DRUG FORMULATION

It is the process by which a number of substances are combined with the active medication to finally produce a drug product that can be successfully given to patients. Apart from active ingredient(s), a drug formulation also contains excipients like diluents, preservatives, vehicles, etc.

ORAL SOLID DOSAGE FORMS

Tablets

In this dosage form the active ingredient (medicine) is mixed with binding agents, excipients, coloring agents, etc., and compressed into small oval or discoid shapes that are suitable for swallowing.



Uncoated tablets

Tablets can be classified in different ways:

Uncoated Tablets

Tablets without any specific coating are termed uncoated tablets.

Coated Tablets

These are having a coating over them, e.g., sugar coated, enteric coated. Coated tablets must be swallowed completely without breaking or chewing them. If the coating is broken advantage of coated tablet is lost.



Enteric coated tablets

- **Sugar-coated tablets**: Sugar coating improves palatability. They are sweet in taste and preferred in children. Some bitter drugs are also available as sugar coated tablet, e.g., chloroquine.
- **Enteric coated tablet**: Tablet is coated with a material that does not allow release of drug in acidic pH of the stomach thereby protecting the drug that could be destroyed by gastric juices. The drug is released only when it reaches in the alkaline medium of small intestine. This should be swallowed as a whole without chewing or breaking.

Scored Tablet and Unscored Tablet



Scored tablets

- Scored tablet is provided with a groove or 'score line' that divides the tablet into 2 or 4 equal parts. This helps in breaking the tablet into equal parts. It provides dose flexibility and ease of swallowing.
- Tablets without any such score line are termed as unscored tablets.

Immediate Release (IR) Tablets

They dissolve and release active ingredient immediately in the stomach. Most of the tablets are IR tablet unless mentioned otherwise.

Sustained/Extended-release Tablets

The drug particles are coated in such a way that they are released at different rates. This dosage form prolong the duration of action of short acting drugs. This reduces frequency of drug administration and improves patient compliance. It must be swallowed as a whole. It contains higher dose meant to act for long time. If it is broken and coating is disturbed, there is a risk of exposure to large doses and toxicity.



Sustained/extended-release tablets

Controlled Release Tablet

It contains a semipermeable membrane that controls the release of drug and makes it long acting. This also must be swallowed as a whole.



Controlled release tablet

Effervescent Tablet

Such tablets release carbon dioxide when they come in contact with water. This helps in quick disintegration and dissolution in water. It improves palatability and imparts a psychological effect on patients.


Effervescent tablet

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Dispersible Tablet

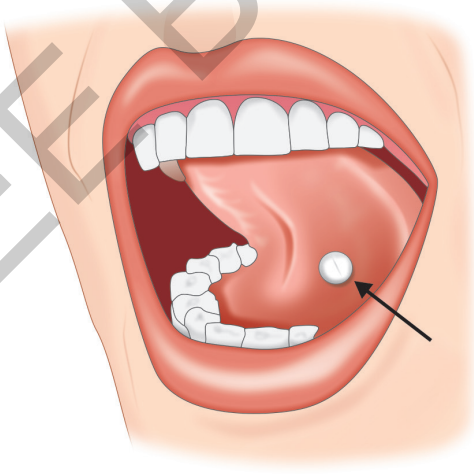
It is added to a small amount of water in which it disperses quickly. This improves the rate of absorption. Example: Dispersible tablet of aspirin.



Dispersible tablet

Sublingual Tablet

This tablet when placed beneath the tongue, it disintegrates and dissolves rapidly and gets immediately absorbed, bypassing the gastrointestinal tract (GIT) and first pass metabolism. Rapid onset, higher bioavailability and rapid termination on spitting are its advantages. Example: Nitroglycerine



Sublingual tablet

Capsule

In this dosage form, powdered or liquid drug is contained in water soluble cylindrical containers made of gelatin. Capsules usually have better patient compliance due to bland taste.

Types of capsules:

Hard Capsule

It is a two-piece cylindrical structure that may contain medicine in the form of powder or liquid. The powdered medicine could be manually filled and prepared when required for research purposes.



Hard capsule

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Soft Capsule

It is one piece gelatin capsule containing liquid or semi-solid medicine. Oily medicines could be easily administered using this dosage form.



Soft capsule

Spansules

It consists of variable coating that releases the medicament gradually in a time based manner. It is also known as timesule.



Spansules

Chewable Tablet/Lozenges

This solid dosage form contain drug along with a suitable gum, sweetening and flavoring agent. It is meant to be kept in mouth and not to be swallowed. Lozenges act by increasing salivary secretion and soothe local mucosa in mouth and throat.



Chewable tablets/lozenges

Powders

The drug is available in finely divided solid form. Powders could be simple powder and compound powder. Simple powder consists of only single medicament, e.g., glucose powder. Compound powder consists of multiple medicaments, e.g., ORS powder. Effervescent powder is also available that releases carbon dioxide when combined with water, e.g., Eno powder.

Granules

These are small aggregates of powder held together by binding agents, e.g., vitamin D granules.

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SOLID TOPICAL DOSAGE FORMS

Dusting Powder

The drug is in the form of finely divided particles meant for external use, e.g., neosporin powder

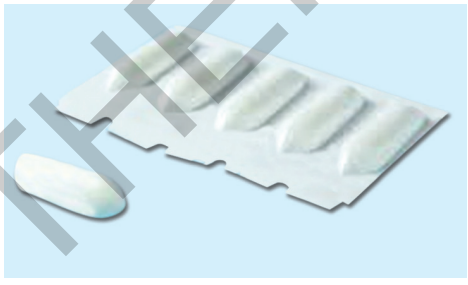
Plasters

These are solid adhesive preparations applied to protect and provide mechanical support to underlying body area, e.g., plaster of Paris.

OTHER SOLID DOSAGE FORMS

Suppository

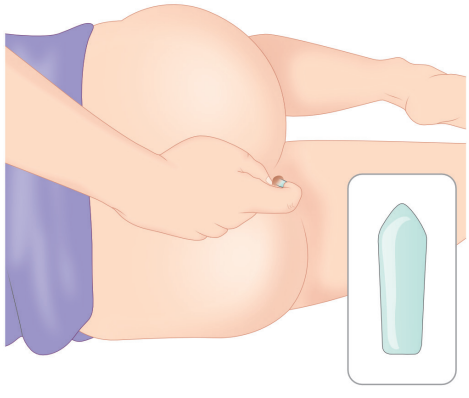
It is a solid dosage form that is inserted in the body through rectum, vagina or urethra, to slowly release the medicine. They are conical at one end for ease of insertion and made up of a substance that melts at body temperature, e.g., cocoa butter, carbowax. Suppositories for vagina are known as pessaries while those for urethra are known as bougies.



Suppository

Guidelines for self-administration of rectal suppository:

1. Wash your hands.
2. Remove the covering.
3. If the suppository is too soft let it harden first by cooling it (fridge or hold under cold running water, still packed!) then remove covering.
4. Remove any possible sharp rims by warming in the hand.
5. Moisten the suppository with cold water.
6. Lie on your side and pull up your knees.
7. Gently insert the suppository, conical end first, into the anal passage.
8. Remain lying down for several minutes.
9. Wash your hands.
10. Try not to have a bowel movement during the first hour.



Rectal suppository

Pellets

These are sterile solid structures made by compression of drug, implanted subcutaneously as depot preparation. The drug is slowly released from the preparation, e.g., testosterone.

Transdermal Patch

It is an adhesive device to be applied on the skin that delivers the drug at a constant rate for systemic absorption. The drug is contained in a reservoir between a backing film and a micropore membrane that controls the rate of drug delivery. Common sites of application are upper arm, chest, abdomen, lower back, etc.

Guidelines for self-administration of transdermal patch application:

1. For patch site, see the instructions provided with the drug or check with the pharmacist.
2. Do not apply over bruised or damaged skin.
3. Do not wear over skin folds or under tight clothing and change spots regularly.
4. Apply with clean, dry hands.
5. Clean and dry the area of application completely.
6. Remove the patch from the package, do not touch the 'drug' side.
7. Place on the skin and press firmly.
8. Rub the edges to seal.
9. Remove and replace according to instructions given.



Transdermal patch

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EXERCISES

Exercise 1: Mention any five oral solid dosage forms with one specific feature of each.

Exercise 2: Enumerate the advantages of oral solid dosage forms.

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Exercise 3: Enumerate the disadvantages of oral solid dosage forms.

Exercise 4: What is the difference between sugar-coated and enteric-coated tablet?

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Exercise 5: Enumerate the advantages of transdermal patch.

Exercise 6: Communicate with the patient in vernacular language on how to use a sublingual tablet.

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NOTES

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Competency-based Practical Manual of PHARMACOLOGY

Competency-based Practical Manual of Pharmacology, 2nd edition is a practical manual based on the Competency-based Medical Education (CBME) Curriculum Guidelines, 2024. The manual includes chapters on all the competencies required for practical and small group teaching of the new competency-based curriculum in Pharmacology. It includes chapters on dosage forms, drug delivery devices, mannequin-assisted exercises, pharmacovigilance, prescription writing, prescription audit, P-drugs list, essential medicine list, drug promotional literature, drug interactions, dose calculations, communication skill-based exercises, and Attitude, Ethics, and Communication (AETCOM) modules.

Salient Features

- Twenty chapters for Pharmacology Practical and Small Group Learning
- Three chapters for the three AETCOM modules specific for Pharmacology
- Multiple exercises for practice of competencies
- Clinical Case-based Scenarios with examples in majority of chapters
- Attitude and Communication Skill Exercises with clinical scenarios
- Relevant Illustrations to remember and relate to specific topics

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ISBN 978-93-6616-496-0

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