

DRUG DISTRIBUTION SYSTEM IN A HOSPITAL

Points to be covered in this topic

- INTRODUCTION
- TYPES OF DRUG DISTRIBUTION SYSTEMS
- CHARGING POLICY AND LABELLING
- DISPENSING OF DRUGS TO AMBULATORY PATIENTS
- DISPENSING OF CONTROLLED DRUGS

INTRODUCTION

- **Drug distribution** is defined as,
“Physical transfer of drugs from storage area in the hospital to the patient’s bedside”.
- **Drug distribution system** falls into **three broad categories**
 - Ward – controlled system
 - Pharmacy controlled **imprest-based system**
 - Pharmacy controlled patient issue system

- This involves **two types of drug distribution**, they are

✓ In-patient distribution

✓ Out-patient distribution

IN-PATIENT DISTRIBUTION

- The **drug distribution to the in patient department** can be carried out from the **out patient dispensing area**.
- The **pharmacists involved in dispensing the drugs for out patient** can **dispense drugs for in patients too**.
- The **pharmacist employed for drug distribution to the in patient wards** should be **well skilled and qualified staff**.



OUT – PATIENTS DISTRIBUTION

- **Out patient** refers to the **patients not occupying beds in hospital** or in **clinics, health centres and other places** where out patients usually go for **health care**.

- No **medicaments** should be issued without the prescription.
- After the issue has been made the quantities supplied must be recorded.
- In short form the **out patient department** was called as **OPD**.



TYPES OF DRUG DISTRIBUTION SYSTEMS

- There are **four** different systems in use for drug distribution in hospitals
 1. **Individual prescription order system**
 2. **Complete floor stock system**
 3. **Combination of individual prescription and floor stock system**
 4. **Unit dose system**

INDIVIDUAL PRESCRIPTION ORDER SYSTEM



- It is a type of **drug distribution system** wherein **physician writes the prescription** for **individual patient** who obtains the **drugs prescribed** from any **medical store or hospital dispensary** by paying **own charges**.
- This system is generally used by the **small and/or private hospitals** because of the **reduced man power requirements** and desirability for **individualised service**.

❖ **ADVANTAGES**

- All **medication orders** are directly reviewed by **pharmacist**.
- It provides the **interaction of pharmacist, doctor, nurse & the patient**.
- It provides **clear inventory control**.

❖ **DISADVANTAGES**

- **Wrong errors, illegible writings** of the physicians.
- **Physician may write high economic drugs** in the prescription or **cost effective drugs**.

2. **COMPLETE FLOOR STOCK SYSTEM**

- **Drugs are given to the patient from the nursing station & the pharmacy supplies** from the **drug store**.
- The way of **floor-stock distribution** includes **2 types** They are:
 - Charged floor-stock system**
 - Uncharged floor-stock system**

i. **CHARGED FLOOR STOCK SYSTEM**



- In this method **medicines** which are stocked in the nursing stations all the times & charged to the patients account after administered to them.
- The **patient is charged for every single dose** administered to him.
- Once the **floor-stock list is prepared** it is the **responsibility of the hospital pharmacist** to make the **drugs available**.

ii. **NON CHARGED FLOOR-STOCK SYSTEM:**

- These system includes the **medicaments placed in the nursing station** that are used by **all the patients on the floor**.
- There shall be **no direct charge from the patients account**.

3. **COMBINATION OF INDIVIDUAL PRESCRIPTION AND FLOOR STOCK SYSTEM**

- This system is followed by **all government hospitals** and also **private hospitals** those run on the basis of **no-profit and no loss**.
- **Surgical items** are given to the **patients**, who purchases and deposit those items in a **hospital wards or rooms** under the supervision of **registered headness**.

4. **UNIT DOSE SYSTEM**

- Those **medications ordered, stored, packed, handed, administrated and charged** in **multiples of single does units** containing a **predetermined amount of a drug or supply sufficient for one regular dose**.
- A **single unit package** is one which contain **one complete pharmaceutical dosage form**.

- Ex- 1 tablet or 1 capsule.

- Two methods of dispensing unit doses are

- i. **Centralized unit dose drug distribution system (CUDD)**

- ii. **Decentralized unit dose drug distribution system (DUDD)**

- i. **CENTRALISED UNIT DOSE DRUG DISTRIBUTION SYSTEM (CUDD)**

- All **in patient drugs** are **dispensed in unit doses** and all the drugs are **stored in central area of the pharmacy** and dispensed at the time dose is due to be **given to the patient**.

- Drugs retransferred from the pharmacy to the indoor patient **by medication cards**.

- ii. **DECENTRALIZED UNIT DOSE DISPENSING**

- This operates through **small satellite pharmacies** located on **each floor of the hospital**.

❖ **PROCEDURE**

- ✓ **Patient profile card** containing full **date, disease, diagnosis** is prepared.

- ✓ **Prescription** are sent directly to the **pharmacist** which are then entered in the **patient profile card**.

- ✓ **Pharmacist checks medication order**.

- ✓ **Patient profile card** and **prescription order** is filled by **pharmacy technicians**.

- ✓ The **nurses administer the drugs** and make the entry in **their records**.

❖ **ADVANTAGES**

- **Better financial control**
- **It prevents loss of partially used medications.**
- **Does not require storage facilities at nursing stations.**

❖ **DISADVANTAGES**

- **Irregular dosage**
- **Skill physician is required for administration of drug.**
- **Regular monitoring is required.**

CHARGING POLICY AND LABELLING

CHARGING POLICY

- The **hospital should** have uniform schedule of **charging of drugs.**
- An **equitable price for drugs** should be kept in mind to **protect the hospital financial interests.**
- These policy can be **categorized under several system like**
 1. **All inclusive**
 2. **A part inclusive rate**
 3. **The professional fee concept**
 4. **Break even point purchase**
 5. **A cost plus rate system**
 6. **The profit aspect**

7. Computerized pricing

1. ALL INCLUSIVE

- In this system, **charges for about 250 patients are studied** and their **average daily charges for drugs and pharmaceutical services** are calculated.
- A comparison of the **actual charge**, and the **projected rate** would produce the **same revenue as the itemized charging method**.
- This system provides **quality pharmaceutical services** and enables hospital to **reduce administrative and accounting cost**.

2. A PART INCLUSIVE RATES

- A **pharmacy service charge** is implemented.

3. THE PROFESSIONAL FEE CONCEPT

- This fee concept is **"the exclusive professional fee to meet all operating expenses including overhead and compensation but not the actual cost of drug and containers"**.
- The concept is **well growing** and is prepared as it **recovers expenses of pharmacy, total hospital expense**.
- This professional fee concept implies that a **percentage of wholesale selling price** is used as a basis for **recovering all direct and indirect expenses**.

4. BREAK-EVEN POINT PRICING

- It is a **useful tool in overall analysis of cost volume relationship** and is defined on the level at which there is **neither profit nor loss**.

5. A COST PLUS RATE SYSTEM

- In this system, **pharmacist maintains a better control using formula.**
- **Desired income from drugs / Cost of prescription drugs × 100 = % above cost to be charged for prescription.**
- It helps in adjustment of cost **fluctuation, difference in currency value, financial requirement.**
- It offers **fairness to the hospital and patients.**

6. THE PROFIT ASPECTS

- In this, **profit is calculated into price to the patient** by following ways
- ✓ A fixed fee per prescription
- ✓ Addition of **predetermined percentage of the break even point figure.**

7. COMPUTERIZED PRICING

- This system is **quite fair** and provides **computerized on-line pharmacy pricing.**
- The **computer program** will ask for only following information
- ✓ Patient number
- ✓ Drug identification number
- ✓ Dose factor
- ✓ Total number of doses dispensed

LABELLING

• Label means **display of written, printed or graphic matter** upon **immediate container** or the **wrapper of a drug package**.

• Types of label

1. Manufacturer label
2. Dispensing label



1. MANUFACTURER LABEL

• A label which contain drug information for the use of medicinal practitioner, pharmacist or nurse supplied by the **manufacturer, paper or drug distribution of the drug**.

Legal requirements of a manufacturer label

- ✓ The name of preparation
- ✓ Strength and dosage form
- ✓ Quantity
- ✓ Instruction for the use
- ✓ Precautions and warning
- ✓ Registration number
- ✓ Batch number
- ✓ Manufacturing and expiry date

✓ Price

✓ Manufacturer information

THE NAME OF PREPARATION

- **Generic name** – according to **drug labelling and packaging rules 1986**
- **International non-proprietary name** means the **name of drugs** as recommended by WHO or may notified by the govt. in the **official gazette**
- **Brand name** – brand name which used to **market the drug**
- **Property of drug company.**

STRENGTH AND DOSAGE FORM

- It is the **amount of active drug per unit dose.**
- Example **amoxicillin 250mg / 500 mg capsules.**
- **Dosage form** – Dosage form of the medicine should be **mentioned on the label.**
- Example – **different dosage forms of amoxicillin, Oral suspension and capsules.**

QUANTITY

- Quantity / **volume present per a packaging unit**

INSTRUCTIONS

- Keep in refrigerator
- Shake well before using
- Give with food

Precautions

- Do not use if pregnant
- Do not drink alcohol after taking medicine
- Do not take other medicine
- Read the medicine guide
- Storage condition – store in a cool place, protect from sunlight
- Warning – for external use only, **flammable**

REGISTRATION NUMBER

- A **number given to a specific drug** when it is **registered** according to specific rules by registration board set up by **federal government**.

BATCH NUMBER

- According to **drug act 1976**
- A **designation printed on label of drug** that identifies the **batch** and **permits the production history** of batch including all stages of manufacturer and controlled to be traced and are viewed

MANUFACTURE DATE AND EXPIRY DATE

- Date started on the label of a drug after which a drug is not expected to retain its claimed efficacy, safety, **quantity, potency** or **after which it is not permissible to sell the drug**.

PRICE AND BAR CODES

- It is an **optical machine readable representation of data**, show data about the object to which it is attached.

MANUFACTURER INFORMATION

- Name and address of company.

2. DISPENSING LABEL

- Label that the **pharmacist attaches to a prescription medicine**.

- It includes:

✓ Drug name and **quantity**

✓ Patient name

✓ Prescription number

✓ Phone number

✓ Instruction for use

✓ Pharmacy name and address

DISPENSING OF DRUGS TO AMBULATORY PATIENTS

- It is also called **ambulatory services** and refers to **those patients who are not occupying beds in hospitals or in clinics, health centers and other places when they come for consultation and diagnosis, treatment.**

- **Categories of Ambulatory Services:**

1. **EMERGENCY OUTPATIENTS**

- For **emergency outpatient, 24 hours services are given** who requires **immediate care for the survival.**

2. **REFERRED OUTPATIENT**

- These patients are **referred to the hospital for a specific purpose** due to **lack of facilities available with the private clinic practioners or patient needs extra care.**

3. **SPECIAL OUTPATIENT**

- After compilation of **general check up** the patients are asked to go for **accurate diagnosis** by the **clinical, pathological or radiological examination.**
- After receiving the **test report of examination** medicine is given to him.

4. **GENERAL OUTPATIENT**

- These patients come for the **general checkup and medicines are prescribed to him.**
- They may either undertake **minor surgery, superficial surgery or dressing at hospital.**

DISPENSING OF CONTROLLED DRUGS

- **Controlled substances** is a **drug or chemical** which ownership, manufacture or use is the **absolutely regulated by a respective government of country** such as **illegally used drugs** or **prescription medications**.
- These laws enforcement leads to **prevention in the unauthorized use of such medications**.
- These laws enforcement leads to prevention in the **unauthorized use of such substances / drugs** such as **central analgesics** (opioids), **anaesthetic**, steroids, etc.
- These **controlled substances** are listed following schedules.

SCHEDULE

SCHEDULE 1

- The drugs under this schedule have **high potential for abuse** and have **no accepted medical use in the treatment**
(e.g Marijuana, raw opium)

SCHEDULE 2

- The drugs under this schedule have **less as compare to above potentials for abuse**, **accepted for medical treatment** and have **less physical dependence and psychological dependence**
(e.g **benzodiazepine and painkiller, phenobarbitone codeine, steroids**).

SCHEDULE 3

- The drugs under these schedules have **less as compare to above potentials for abuse**, **accepted for medical treatment** and have **less physical dependence and psychological**

dependence

(e.g benzodiazepine and painkiller, phenobarbitone, low strength codeine, steroids etc)

HOSPITAL CONTROL PROCEDURE

- Following **procedure and person/department** is responsible for **manufacture and record of control substances in hospital**.

PHARMACIST IN CHIEF

- Responsible for the **purchase, storage accountability, and appropriate dispensing of the control substances in the hospital**.

HEAD NURSE

- Responsible for the **record of proper storage**.

ADMINISTRATION HEAD

- Responsible for the **proper safeguarding and handling of controlled substances**.

POLICIES AND PROCEDURE FOR ORDERING OF CONTROLLED SUBSTANCES

PREPARATION OF ORDERS

- Order of the **control substances**, should be made by **using ink or incredible pencil, typing and duly sign by the respective doctor**.

DOCTORS ORDERS FOR ADMINISTRATION OF CONTROLLED DRUGS

- Order of **control substances for ward stock** must on **physician order sheet or patient chart**.

- If the control substances for ward stock must write on physician order sheet or patient chart.

- If the control substances are not in ward stock.

❖ PRO RE NATA ORDERS (PRN ORDER)

- This type of order must be discouraged except under special circumstance.

❖ ORDERING NON- WARD STOCK-CONTROLLED DRUGS FROM PHARMACY

- Ordering of the control substances for non-ward stock done by doctor sign and if more substances are again needed then doctor may sign again.

❖ ORDERING WARD STOCK- CONTROLLED SUBSTANCES FROM PHARMACY

- Ordering of the control substances from pharmacy must be taken on the ward stock from which is completed by placing a check mark on the opposite the name, and strength.
- This order from must be duly sign by the doctor.

PROCEDURE FOR DISPENSING OF CONTROLLED SUBSTANCES FOR IN PATIENTS

Doctors order for administration



Ordering of ward stock from pharmacy



Narcotics and controlled drugs on wards by nurse



Charges for narcotics to the Patient

PRESCRIBING OF CONTROL DRUGS IN OUT PATIENT DEPARTMENT (OPD)

- Dispensing of the **controlled drugs for outpatient from pharmacy** must be the made on the **prescription only** by **clearly mentioning the strength and the quantity with duty sign of doctor**.
- The information for such order includes:
 - ✓ **Date.**
 - ✓ **Details of patients.**
 - ✓ **Patients hospital number.**
 - ✓ **Amount of drug ordered.**
 - ✓ **Strength.**
 - ✓ **Name of the prescriber and their signature.**

HOSPITAL FORMULARY (PART - 2)

Points to be covered in this topic

→ INTRODUCTION

→ CONTENTS OF HOSPITAL FORMULARY

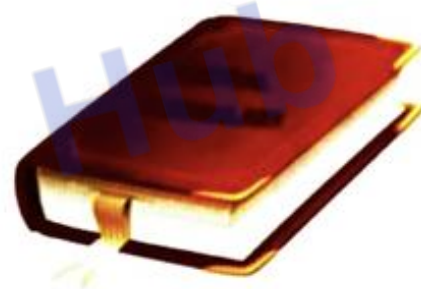
→ DIFFERENTIATION OF HOSPITAL FORMULARY AND DRUG LIST

→ PREPARATION AND REVISION

→ ADDITION AND DELETION OF DRUG

INTRODUCTION

- The **hospital formulary** is a **continuously revised compilation** of pharmaceutical dosage agent and **their forms etc.** • Which reflects the current clinical judgment of the medical staff.
- The **hospital formulary system** is a method whereby the medical staff of a hospital with the help of **pharmacy** and **therapeutic committee** selects and **evaluate** medical agents and their dosage form which are considered to be **most useful in** the patient care.
- The **hospital formulary system** provides the information for procuring, prescribing, dispensing and administrative of drug under **non proprietary names** and instance where drugs have both names.



ORIGIN IN INDIA

- The **first hospital formulary in India** was **published in 1968** by the **department of pharmacy, CMC, Vellore**.
- The **first hospital formulary for the development of government hospital teachings** was **published in 1997** at **government medical college, Trivendrem, Kerala**.

GUIDELINE FOR HOSPITAL FORMULARY

- The **governing body of the hospital** shall appoint a **pharmacy and therapeutic committee** composed of **physician and pharmacist** which will prepare the **hospital formulary system**.
- The **medical staff in the governing body** shall sponsor and outline the **purpose, organisation function and scope of the hospital formulary system**, it should adopt the **principle as per the need of particular hospital**.
- The **pharmacy and therapeutic committee** shall develop **policy and procedure governing the hospital formulary** and the **medical staff** shall **adopt these policies and procedures** subject to **administrative approval**.
- The **policy and procedures** shall afford guidance in the **appraisal, selection, procurement, storage, distribution, use, safety procedures and other matter relating to drug in the hospital** and shall be **published in the hospital formulary or other media available to the member of medical staff**.
- To ensure the **maintenance of the responsibility and procreative of the physician** in the exercise of his **professional judgment**.
- The **medical staff shall adopt** the **policy formula, and procedure for including drugs in the formulary by their non proprietary names** even though proprietary names continue to

being use in the hospital physicians. He may be encouraged to prescribe drug under their non proprietary names, although nomenclature used in entirely a matter of individual Practitioner's discretion.

- In the absence of written policies approved by the medical staff related to the operation.
- The hospital shall make it certain that the nursing personnel are informed in writing through its system of news of communication that there exists the formulary system in the hospital and the procedure governing its operations.
- In the formulation of policies and procedure the term substitute or substitution should be avoided since these terms have been used to imply the unauthorized dispensing of entirely different drug, neither of which takes place under a properly operated hospital formulary system.
- It shall be made known to the medical staff about the changes in the working in the hospital formulary system or in the content of the hospital system.
- Provision shall be made for the appraisal of the member of the medical staff for the use of the drug not included in the formulary or the investigational drugs.
- The pharmacist with the advice and guidance of the pharmacy and therapeutic committee, shall ascertain the quantity and source of supply of all drugs, chemical, biological and pharmaceutical preparation used for diagnosis and treatment of patient.
- The labeling of drug and medicine container with non proprietary name of the content always should be proper. The use of proprietary name other than that describing the actual

content is not correct and proper if it is used in a manner that can be taken as description of the content.

MEMBERS INVOLVED IN THE PREPARATION OF HOSPITAL DRUG FORMULARY



- A representative clinician from each major specialty
- A clinical pharmacologist
- A nurse, usually the senior infection control nurse, or sometimes the matron
- A pharmacist (usually the chief or deputy chief pharmacist)
- A clinical microbiologist or laboratory technician where there is no microbiologist

- A member of the hospital records department
- An administrator, representing the **hospital administration** and **finance department**

CONTENTS OF HOSPITAL FORMULARY

• The **main objective of a formulary** is not only to **control the use of drug** but also to supply useful information to the prescribers.

• The **primary objective of the formulary** is to provided the **hospital staff** with

✓ Information of drug products approved by PTC

✓ Information of hospital policies and procedures governing the use of drug

✓ Special information regarding drug.

• In this view there are **three main section of formulary**

1. **Information on hospital policies and procedures concerning drugs.**
2. **Drug products listing**
3. **Special information**

1. INFORMATION ON HOSPITAL POLICIES AND PROCEDURES CONCERNING DRUGS

- Information on **hospital regulations governing the prescribing, dispensing, administration of drugs**
- Description of PTC

- Pharmacy operating procedures
- Information on using formulary
- How the formulary and the entries are arranged in the system.

2. INFORMATION DRUG PRODUCTS

- This section is the **heart of formulary** and consist of **descriptive entries for each item**.

❖ FORMULARY ITEM ENTRIES

- Alphabetically by **generic name**
- Alphabetically within **therapeutic class**

❖ TYPE OF INFORMATION

- Dosage form, strength, packaging
- Active ingredients
- Adult / pediatric dose
- Route of administration
- Cost

❖ INDEXES TO THE DRUG PRODUCTS LISTING

- Generic name / brand name
- Therapeutic / pharmacological index

SPECIAL INFORMATION

- Equivalent dosages of similar drugs
- hospital approved abbreviations
- Rules or calculating pediatric dosages
- List of sugar free drugs
- List of dialyzable poisons
- Metric conversion tables
- Poison control information
- Table of drug interactions

PREPARATION OF FORMULARY

- Essential point of formulary for improving drug **therapy in hospitals**.
- **Effectiveness of formulary system** depends on the **abilities of the pharmacists** involved with it.
- It is **decided by PTC**.
- Visually pleasing, easily readable and **professional in appearance**.
- A drug that has **specific advantages in a small number of patients** will be **included in the formulary**.
- The **initial step in the preparation of a formulary for any hospital** is its size.
- A **typical formulary** must have the **following composition**:

1. Title page
2. Names & titles of the members of the PTC
3. Table of contents
4. Information on hospital policies & procedures concerning drugs
5. Products accepted for use at hospital
6. Appendix

CONTENTS

1. INTRODUCTION

- List of abbreviations
- List of drug used in the formulary

2. BASIC INFORMATION ON EACH DRUG

- Efficacy for the treatment of specific conditions
- Safety profile of the item
- Interaction profile
- Adverse effect
- Pharmacokinetic profile
- Availability of the item
- Availability dosage form

- Cost
- Acceptability to patients

3. SUPPLEMENTARY INFORMATION ON EACH DRUG

- Storage guidelines
- Patient counselling information
- Labelling information
- Brand names and price

4. PRESCRIBING AND DISPENSING GUIDELINES

- Principles of prescription writing
- Reporting of ADR
- Prevention of ADR

5. GENERAL DRUG USE AND ADVICE

- Use of IV drugs
- Special situations like pregnancy, breast feeding, liver / kidney diseases
- Poisoning information and antidotes
- Treatment of snakebites and insect bites

6. MISCELLANEOUS SECTION

- Children's dose

- Renal adjustments
- Metric units
- Diagnostic aids

DIFFERENTIATION OF HOSPITAL FORMULARY AND DRUG LIST

HOSPITAL FORMULARY

- Listing of drugs by their generic names followed by information on strength, form, Posology, toxicology, use and recommended quantity to be dispensed.
- Prepared by locally by its own clinical staff
- Information provided is subject to local needs and desires.

DRUG LIST

- Generic names followed by data on strength and form
- Prepared by country's outstanding clinicians, pharmacologists, and pharmacists.
- According to their pharmacological properties.

ADDITION AND DELETION OF DRUG

ADDITION

- The assessment of new medicines is critical to managing a formulary list, which involves Adding new medicines and deleting old ones.
- Drugs should be evaluated and compared on the basis of
 - ✓ Efficacy, comparative efficacy

✓ Effectiveness, comparative effectiveness

✓ Safety, comparative safety

✓ Cost of use

✓ Quality

- **Efficacy**, effectiveness and safety can be **evaluated from a critical assessment** of the literature.

- A **request for inclusion of a drug** in the hospital formulary shall be made by **submitting a formulary addition request** along with supporting literature and a signed disclosure of dual **interest to the pharmacy and therapeutics**.

- The **committee** will make one of the **following decisions** regarding the request:

✓ Approval

✓ Denial

✓ Deferment

DELETION

- Suggestions for **deletion of drugs from the formulary** may be **submitted to the P and T committee** by any member of the **medical, pharmacy, or nursing staff**.

- In order to **control growth of the hospital formulary**, some additions will be **balanced by deletions of another drug**.

- **P and T committee** shall periodically review its **stocks and various therapeutic classes** on an ongoing basis to effect **deletion of duplicate drugs** whose usage is low or those which can readily be replaced by **less costly but equally**.

THERAPEUTIC DRUG MONITORING (PART -3)

Points to be covered in this topic

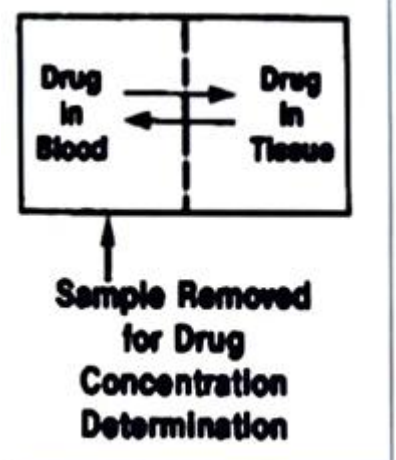
- INTRODUCTION
- NEED FOR THERAPEUTIC DRUG MONITORING
- FACTORS
- INDIAN SCENARIO

INTRODUCTION

- **Therapeutic drug monitoring** refers to the **measurement of drug concentrations** in **biological fluids** with the purpose of **optimizing a patients drug therapy**.

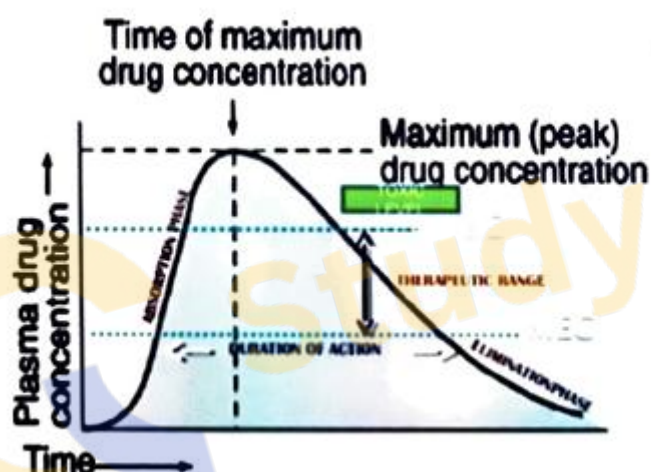
- During **administration of a dosage regimen**, the concentration should be maintained within the **therapeutic window**.

- **TDM** refers to the **tool utilized** to individuals **dosage regimen** by maintaining **plasma or blood drug concentrations** within the **therapeutic range**.



CONCEPT OF TDM

- **TDM** is based on the principle that for **some drugs** there is a **close relationship between the plasma level of the drug and its clinical effect**.
- If such a relationship does not exist **TDM is of little value**.
- The clinical value of **plasma level of monitoring depends** on how precisely the **treatment outcome can be defined**.
- When a precise **therapeutic end point is difficult to define**, **monitoring of drug levels** may be of **considerable therapeutic assistance**.



FUNCTION

- Select drug
- Design dosage regimen
- Evaluate patient response
- Determine need for measuring serum concentration
- Assay for drug concentration in biological fluids

- Perform pharmacokinetic evaluation of drug concentration
- Re-adjust the dosage regimen

CRITERIA FOR TDM

- An appropriate **analytical test for drug and active metabolites** must exist.
- Drug should have a **narrow therapeutic range**.
- Patients not showing **adequate clinical response** to a drug despite being on **adequate dose**.
- The therapeutic effect can **not be readily assessed by the clinical observation** (e.g. anticonvulsants, antiarrhythmics, etc.)
- Large **individual variability** in steady state **plasma concentration** exists at any given dose.
- There are several classes of drugs **commonly monitored** to ensure correct **blood concentration**, including the following:
 - ✓ **Antiepileptics** (phenytoin, valproic acid etc.)
 - ✓ **Antiarrhythmics** (digitalis, lignocaine etc.)
 - ✓ **Antibiotics** (gentamycin, amikacin, tobramycin)
 - ✓ **Antineoplastics** (methotrexate)
 - ✓ **Antimaniacs** (lithium)

✓ **Bronchodilators** (theophylline)

✓ **Immunosuppressive** (cyclosporine)

NEED FOR THERAPEUTIC DRUG MONITORING

- The **number of studies in recent years** has pointed to a need for more **intensive monitoring of drug therapy**.
- These reports have identified following reasons.

1. POLYPHARMACY

- The overuses of **medications by patients** and over **prescribing by physician** have repeatedly been cited as cause of **drug induced disease**.

✓ Ex: **Hospital patients** – 8-10 drugs receive.

✓ **Nursing home patients** – 5-9 drugs receive.

✓ **Ambulatory patients** – 5-6 drugs receive.



2. ADVERSE REACTIONS

- **Adverse drug reactions** of drugs are a **major public health problem** and it accounts for **3-5% admitting to hospitals**.
- More **careful prescribing and monitoring** **60-80% adverse reactions** can be **prevented**.



3. MEDICATION ERRORS

- **Hospitalised patients** usually face problems with by **nurse** **wrong drug administration** or **pharmacist** in dispensing multiple doses.



- **Unit dose drug distribution** significantly decreases the **medication errors**.

4. NON-COMPLIANCE

- **Prescribed therapy** also represents **major public health problems**.
- **Non compliant patients** can be identified and **appropriate education** is given.



FACTORS

FACTORS INFLUENCING IN THERAPEUTIC DRUG MONITORING

1. **Patient demographics**
2. **Patient compliance**
3. **Individuals capacity** to absorb / distribute / metabolize / excrete the drug
4. **Concomitant disease, tropical disease and nutritional deficiencies**
5. **Alternative system of medicine**
6. **Alcohol and tobacco use**
7. **Medication or sampling errors**
8. **Laboratory errors**

9. Cost effectiveness

10. Quality control in drug assay

11. Genetic factors

1. **PATIENT DEMOGRAPHICS** • Age, sex and lean body weight are particularly important for renally cleared drugs as knowledge of these allows calculation of creatinine clearance.



2. **PATIENT COMPLIANCE**

• If the concentration of the drug is lower than expected, the possibility of non compliance should be considered before a dose increase is recommended.



3. **INDIVIDUALS CAPACITY TO ABSORB / DISTRIBUTE / METABOLIZE / EXCRETE THE DRUG**

✓ **Absorption**

• Absorption refers to the ability and process of a dosage reaching the blood stream.

• There are different routes of drug administration.

• The most common are: Oral, Intramuscular, Subcutaneous, Rectal etc



✓ **Distribution**

• Once the drug is absorbed, a certain drug concentration is reached in the body.

- The **volume in which the drug is distributed** is a product of the **drug's dose** divided by the **plasma concentration**.

- **Half-life information** is used to determine the **correct drug dose** required to attain the **desired therapeutic range**.

✓ **Metabolism**

- In addition, **drug metabolites** can be either **protein bound (inactive)** or **free (active)**.

- The **drug dosage** will depend on how the **drug metabolizes**.

- Factors that **impact drug metabolism** includes **genetics, environment, nutrition, and age**.

✓ **Excretion**

- **Drug excretion from the body** occurs through the **kidneys**, or fluids excreted through the **lungs, GI or skin**.

- **Renal dysfunction** reduces **drug clearance** and may contribute to **drug accumulation** and increased risk of **adverse drug effects**.

4. **CONCOMITANT DISEASES, TROPICAL DISEASE AND NUTRITIONAL DEFICIENCIES**

- This includes diseases **highly prevalent in developing countries** such as

- **Infections** ,

- **Diarrhoea**



Distribution



Metabolism



Excretion

- Tuberculosis
- Nutritional deficiencies
- Higher proportion of patients with diabetes and AIDS



5. ALTERNATIVE SYSTEM OF MEDICINE

- India is unique in having at least three systems of medicines coexisting with western medicine ; ayurveda, homeopathy and unani.
- A patient with a history of generalized tonic – clonic seizures, well controlled and with plasma phenytoin levels within the therapeutic range, presented with sudden loss of seizure control.



6. ALCOHOL AND TOBACCO USE

- Chronic use of alcohol has been shown to cause **non-specific hepatic microsomal enzyme induction**, resulting in **increased clearance and decreased serum concentrations of hepatically cleared drugs**.

- Cigarette smoking increases the hepatic clearance of theophylline and patients who have recently **stopped smoking** may have **unexpectedly high theophylline concentrations**.



7. MEDICATION OR SAMPLING ERRORS

- In cases where the **TDM result is incompatible** with drug administration records, the possibility of a medication or sampling error should be considered.

- For example, the drug may have been given to the **wrong patient**, or **blood** may have been mistakenly drawn from a patient in a **neighbouring bed**.



8. LABORATORY ERRORS

- If a **laboratory error** is suspected, the **laboratory** should be **contacted** and asked to **repeat the assay**.

- Alternatively, a **new blood sample** can be **drawn and sent to a different laboratory** for assay.



9. COST EFFECTIVENESS

- **Rapid and cost effective measurement** of most drug is indicated can be achieved using **commercial kits analysers** using a number of **different methodologies** including **fluorescence polarization immunoassay**.



10. QUALITY CONTROL IN DRUG ASSAYS

- For **TDM programs**, **quality control is vitally important** and in **developing countries** there are hardly any procedures for **laboratory accreditation or external quality control**.



- In **India**, **one centre in Southern India** offers an **external quality control program** (for biochemical tests).

11. GENETIC FACTORS

- It plays an as yet **poorly defined** role in **therapeutic drug monitoring**, as is the case of the **poor ability** of some racial groups to **acetylated drugs**.



INDIAN SCENARIO

- **TDM service** began in a small way in **1988** with a **single HPLC** and one **research assistant** in a tiny **laboratory trucked away** in a corner of an 1800 bed teaching public hospitals.

- Even though **TDM has grown itself into an unavailable** part of health care system and the **position has gained** due respect and support from the patients and medical

professionals equally, it seems that the **Indian** government officials are turning a blind eye to these **developments taking place globally**.

- In India there are **no regulatory guidelines** for having a **qualified clinical pharmacist** in the Indian hospitals.

- The **main reason** for this phenomenon is the **lack of recognition** of the post of clinical **pharmacist at the regulatory level**.

- The **students after completion** of their studies are either **forced to take up a job in an industry or move into academics**, the last option being to **seek jobs abroad** where the pharmacy professions is well received.

- Many **pharmacy schools** have started to understand the **impotence of pharmacy practice** and are including it in the **four year syllabus of the UG course**.

- **Another positive sign** is the **introduction of Pharm D courses** in a handful of **institutions in India**.

- Its **six year doctoral course including one year rotating internship** aimed at creating **competent clinical pharmacist** for the **hospital in India**.

- The **current scenario** can only be brought **under control by the timely intervention from the government authorities**, as a nurturing **regulatory environment** is a necessity for the development of **health professions like pharmacy** and also with the **collaborative efforts from the academics leaders and government authorities**.

- TDM has the bright potential to grow into a very strong pharmacy wing in the health care system, particularly in a country like India with such a strong medical foundations and dynamic and varied population waiting to receive any additional patient services.
- The only way that clinical pharmacy can grow unhindered in India as by gaining the support and acceptance of the entire medical profession and community as whole, and this in turn sets in the hands of the present day pharmacy students and pharmacy professionals.

❖ APPLICATIONS OF THERAPEUTIC DRUG MONITORING

1. Monitoring of certain drugs with the increased efficacy and decrease incidences and side effects
Ex- theophylline , methotrexate.
2. Used in developing dosing protocol this will avoid non-optimum initial therapy.
3. It provides additional input in pharmacotherapy. Monitoring encourages professional interaction between members of the health care teams and physician and pharmacist.
4. Monitoring determines the safety of the dosage regimen.
5. It provides an opportunity for clinical pharmacist to excel in therapeutic challenges.

MEDICATION ADHERENCE (PART -4)

Points to be covered in this topic

→ INTRODUCTION

→ CAUSES OF MEDICATION NON ADHERENCE

→ PHARMACIST ROLE

→ MONITORING

INTRODUCTION

• It is defined as the **exact or extent to which a patient medication taking behaviour** concedes with the intention of the **health advice he / she has** been given.

• **Medication adherence** is the one of the **most important factors** that determines the **therapeutic out comes**, especially in a **patient suffering from chronic illness / diseases**.



✓ Compliance

• How well the **patient follows the instruction of when and how to take the medication**.

✓ Persistence

• Duration of time **patient takes medication**, from **initiation to discontinuation of therapy**.

• Adherence is a **multidimensional phenomenon** determined by the interplay of **fives sets of factors**, termed “**dimensions**” by the world health organization

- ✓ Social / economic factors
- ✓ Provider – patient / health care system factors
- ✓ Condition related factors
- ✓ Therapy – related factors
- ✓ Patient related factors



1. SOCIAL AND ECONOMIC DIMENSION

- Limited English language proficiency
- Low health literacy
- Lack of family or social support network
- Unstable living conditions ; homelessness
- Burdensome schedule
- Limited access to health care facilities
- Lack of health care insurance
- Inability or difficulty accessing pharmacy
- Medication cost
- Cultural and lay beliefs about illness and treatment
- Elder abuse



2. HEALTH CARE SYSTEM DIMENSION

- Provider – patient relationship
- Provider communication skills
- Disparity between the health beliefs of the health care provider and those of the patient
- Lack of positive reinforcement from the health care provider
- Weak capacity of the system to educate patients and provide follow – up
- Lack of knowledge on adherence and of effective interventions for improving it
- Patient information materials written at too high literacy level
- Restricted formularies ; changing medications

covered on formularies

- High drug cost , copayments , or both
- Poor access or missed appointments
- Long wait times
- Lack of continuity of care



3. **CONDITION RELATED DIMENSION**

- Chronic conditions
- Lack of symptoms
- Severity of symptoms
- Depression
- Psychotic disorders
- Mental retardation / developmental disability



4. **THERAPY RELATED DIMENSION**

- Complexity of medication regimen
- Treatment requires mastery of certain techniques
- Duration of therapy
- Frequent changes in medication regimen
- Lack of immediate benefit of therapy
- Medications with social stigma attached to use
- Actual or perceived unpleasant side effects
- Treatment interferes with lifestyle or requires significant behavioral changes



5. PATIENT RELATED DIMENSION

✓ Physical factors

- Visual impairment
- Hearing impairment
- Cognitive impairment
- Impaired mobility or dexterity
- Swallowing problems



✓ Psychological / behavioral factors

- Knowledge about disease
- Perceived risk / susceptibility to disease
- Understanding reason medication is needed
- Expectations or attitudes toward treatment



- Perceived benefit of treatment
- Confidence in ability to follow treatment regimen

BENEFITS OF MEDICATION ADHERENCE

- Enhances patient safety
- Decrease health care costs
- Improves long term therapies and outcomes
- Good investment for tackling chronic conditions

CAUSES OF MEDICATION NON ADHERENCE

- The **causes of nonadherence** can be managed to **reduce the risk** of the patient not taking their medication.
- Let's **dive deeper into the causes** to explore what **continues to drive medication non-adherence**.

FORGETFULNESS

- Just like **implementing any new habit**, incorporating the act of taking medication into your daily routine can be a **challenge at the start**.
- It requires **reminders, accountability, and drive to stay consistent**.
- Even for **veteran medicators**, a change in **environment or schedule** can throw off their routine and lead to missed doses.



FEAR AND WORRY

- As a **patient**, it's common to have **anxiety around new medication**, perhaps around **expected side effects** or the **social stigma of taking medication in public**.
- This may result in a **patient intentionally not taking their medication** and then **fearing to tell the truth to their healthcare provider**.
- By **educating the patient** on their condition, their **upcoming journey**, how to cope with **side effects**, and the **importance of their medication** – they can be **better supported** to overcome any **fears or challenges** they may face.



MISUNDERSTANDING

- What a **medicine is prescribed for**, how the **medication should be taken** (e.g. together with a meal or not), and for how long the **medication should be taken** is **information** that can often be **misunderstood or misinterpreted** between **doctor and patient**.



ADVERSE SIDE EFFECTS

- For many, the **side effects of a new medication** may be too **negative or intense** to wish to **continue being adherent**.
- Similar to **fear and worry**, a **patient may intentionally stop taking their medication** due to the **side effects**.



- It is important to **report any adverse side effects** and to **discuss with a doctor** how to **manage side effects** that will appear along the way and **when it is time to change medication** if they **become too negative**.

COMPLEX MEDICATION SCHEDULES

- **Complex medication schedules** require **supporting your medication organization** in addition to having **set reminders** to take **doses** throughout the day at the right time intervals.

- For **some patients**, such as **minors**, others may have to be **involved to support the patient in medicating**.



LACK OF SYMPTOMS

- It has been shown that it is **particularly difficult to maintain** a medication taking behaviour when the **medicine** is of preventive nature.

- If a **medication is taken to avoid an event** in the future and when the **patient** does not feel any direct positive effect from taking the medication or direct negative effect from not taking the medication it is of course **even harder to keep the motivation high**.



SUFFERING MENTAL HEALTH

- If a **patient suffers from a mental illness** which **negatively** alters their mental state, this can impact a **patient's** ability to take their medication on schedule and as prescribed.

- **Mental health support** along a **patient's journey** is key to ensure that they can feel the best they can to **actively** contribute to **their own treatment**.



PHARMACIST ROLE

- Pharmacists often provide verbal education and written individualized information for the **patient** although the **benefits of these strategies alone are unclear**.

- Macdonald studied the effects of patient education by pharmacists on medication adherence in post-discharge patients, which demonstrated a **clear benefit in the patients** receiving education **from** pharmacists.

- In an **unpublished study** by authors, **clear benefit** was demonstrated in a **randomized control trial** in both **asthma and COPD patients** with a **follow-up period of two months** in improving **medication adherence** along with the **inhalation technique** following **pharmacist-based educational interventional program**.

- It was **interesting to note** that the **improvement in the inhalation technique** continued with each **educational sitting**.

- The **patients received both oral education and written instructions** in the **local language** about their diseases, need for **regular medication** and the **importance of each medication** in an **educational programme lasting 45 minutes in each sitting**.

- The information that **patients need to know which pharmacists can impart includes:**

- ✓ **Name and purpose of the drug. When and how to take the medication.**

- ✓ **Possible side effects.**

- ✓ **Precautions.**

- ✓ **Interaction with food or other drugs.**

- ✓ **Duration of therapy.**

- ✓ **Action to take if a dose is missed.**

- ✓ **How to tell if the medication is working or not working.**

- Apart from **patient education**, a **pharmacist** may contribute towards **improving medication adherence** by other means including advice to prescribers on the **simplification of drug regimens**, providing patients with **medication cards or medication aids** such as a **dosette**, and by **identifying the predisposing, enabling, and reinforcing factors** which may contribute towards **medication non-adherence**.

- Though **patient interviews**, the pharmacists can assess the **patient's knowledge of their drug therapy and usual medication habits**.

- For example, does the **patient have a set of routine** and is **family support** available to **supervise medication use**.

- The **pharmacist** is also able to identify if the **patient** has any specific problems with **medication**, such as a **problem swallowing large tablets**, or **difficulty opening child-proof containers**.
- The **pharmacists can also assess** the patient's ability to comprehend and recall **information**, and if an **adverse drug reaction** may discourage **medication adherence**.

❖ **STRATEGIES TO IMPROVE THE PHARMACIST–PATIENT RELATIONSHIP**

- Be **friendly and approachable** to the patient.
- Improve **communication skills**.
- Take into **account the spiritual and psychological needs** of the patient.
- Improving **patient education**.
- Encourage the **patient to discuss there main concern without interruption (or) premature closing**.
- **Elicit the patient perception** of the illness and **associated feelings and expectations**.
- Learning methods of **active listening and empathy**.
- Give **clear explanation**.
- Check the **patient understanding**.
- Simplify the **therapeutic regimes**.
- Monitor the **side effects**.
- Monitor the **beneficial effects**.
- Speak the **same language of patient**.
- Involvement of **patient treatment discussion**.

- Through the **patient interviews** the **pharmacist** can assist the **patient knowledge** of their **drug therapy** and **usual medication habits**.

MONITORING

- Assessment, quantification, measurement and evaluation of adherence

❖ DIRECT METHODS

- Drug monitoring
- Detection of the drug or its metabolites in biological fluid
- Direct observation therapy
- Most accurate methods of **adherence measurement** but are **expensive**.

✓ Direct measurement

- Home finger prick sampling.
- Biological markers
- Directly observed therapy

❖ INDIRECT METHODS

- Self reports
- Pill counts
- Rates of prescription refills
- Assessment of the patient's clinical response
- Measurement of physiologic markers as well as patient diaries

✓ Indirect measurement

- Self report measure
- Morisky's medication adherence scale
- Medical outcome adherence study scale
- Brief adherence rating scale
- Electronic adherence monitoring

PATIENT MEDICATION HISTORY INTERVIEW (PART - 5)

Points to be covered in this topic

- INTRODUCTION
- NEED FOR THE PATIENT MEDICATION HISTORY
- MEDICATION INTERVIEW FORMS

INTRODUCTION

• **Medication history** is a part of **pharmaceutical consultation** that identifies and **document** **allergies** or other **serious adverse drug medication events** as well as information about how **medicines are taken** **currently and have been taken in the past.**



- **Starting point for medication reconciliation and medication review.**
- Part of **medical history** which focuses on **medication therapy**.

NEED FOR THE PATIENT MEDICATION HISTORY

- The goal of a **medication history interview** is to **acquire information on aspects of drug use by patients**.
- So, such information may help pharmacists for **improvement in the overall care of a patient**.
- The **collected information** can be **helpful to achieve the following goals**:
 1. Helps to **investigate the medication discrepancies** by comparing the **medication profile with the medication administration record**.
 2. Other staff verify the **collected history of a patient** and can provide **additional information wherever require appropriately**.
 3. Helps to **document the allergies and drug-related adverse reactions**.
 4. Helps to **evaluate the rationale for prescribing drugs**.
 5. Helps to **assess indications of drug abuse**.
 6. Helps to **check the drug interactions**.
 7. Helps to **access drug administration techniques**.
 8. Helps to **examine the requirement of assistance in medication**.

IMPORTANCE OF ACCURATE MEDICATION HISTORY

- Helps in the **prevention of prescription errors** and subsequent risks to the patients.
- Helpful in a **finding of drug-related pathology** and any clinical signs due to results of **drug therapy**.
- Considering all **accurate medication history information** helps to establish a **better care plan for the patients**.

STAGES OF PATIENT MEDICATION HISTORY

- There are **three stages** involved while practicing for patient **medication history**.

The **objective and procedure** at each stage are discussed below:

❖ STAGE 1: BEFORE TAKING MEDICATION HISTORY

✓ **Objective:** To create **good relationships** and **build confidence** in patients.

✓ **Method:** Following are different steps in this procedure:

1. **Confirmation of patient identity.**
2. **Self-Introduction.**
3. **Reason of interrogation and total time required for interrogation.**
4. **Initiate in taking of medication history of a patient.**

❖ STAGE 2: DURING TAKING OF HISTORY

✓ **Objective:** To collect **accurate information** on the medication history.

✓ **Method:** Following is the step followed in this stage:

1. Ask the question according to the format given for the **collection of medication information**.

❖ **STAGE 3: AFTER TAKING HISTORY**

✓ **Objective:** Documentation and **analysis of information**.

✓ **Method:** Following are steps follow in this stage:

1. After completion of the interview, a **pharmacist must express appreciation** for providing this information.
2. Review and analyzes the **past medical record**.
3. Documentation of important **medication history data of a patient**.

❑ **A PATTERN OF QUESTIONS TO BE ASKED BY PHARMACIST IN INTERVIEW**

✓ Following are **some questions patterns** that may be asked by **pharmacists** while a **collection information on the medication history**.

- The name of the **medication used**.
- Type of **dosage form**.
- **Dose** of medication.
- How are they **taking it (by which route)?**

- How many **times take in a day**?
- For what **reason you are taking medications**?
- Any **allergic reactions** were seen with **medications** and what was the reaction?
- Are you taking **any medicine** on a **regular/needed basis**? If yes, for what reason?
- Any **counter medications** are you taking on a **regular or as-needed basis**? If yes, for what reason?
- Any **traditional medicines** are you taking on a **regular or as-needed basis**? If yes, for what reason?
- Any **vitamins or other supplements** are you taking? If yes, for what reason?
- **Have you taken any new medicine**?
- Are there **any changes in dose or stop of medication** by a doctor recently?
- Recently did you **minimize the doses or stop any of your medications**?
- Are any of the **medications producing any kind of side effects**?
- Did you **stop or change any medications due to unwanted side effects / feel worse**?
- Did you **stop taking your medicine sometimes whenever you feel better**?

PATIENT MEDICATION HISTORY INTERVIEW FORM				
Date: ____/____/____				
NAME:				Birthdate: ____/____/____
	Last	First	M. I.	
Age: ____	Sex: ☐ F ☐ M			
How did you hear about this clinic?				
Describe briefly your present symptoms:				
Please list the names of other practitioners you have seen for this problem:				
Psychiatric Hospitalizations (include where, when, & for what reason):				
Have you ever had ECT?		Have you had psychotherapy?		

COMMUNITY PHARMACY MANAGEMENT (PART - 6)

Points to be covered in this topic

→ INTRODUCTION

→ FINANCIAL

→ MATERIALS

→ STAFF

→ INFRASTRUCTURE REQUIREMENTS

INTRODUCTION

☐ COMMUNITY PHARMACY

- Community pharmacy is a **pharmacy service center** established in a **community set up** catering to the needs of the **society** for their **drug products, health care items and related materials**.
- Community pharmacy in India is known as **retail pharmacy store** or simply a **drug store**.

☐ COMMUNITY PHARMACY MANAGEMENT

- Represents all activities involved in the **organization and direction** of getting people together to **accomplish desired and objectives of pharmacy enterprises**.



OBJECTIVES

- Compare the **proportion of the patients receiving appropriate treatment**, as defined by currently available **evidence and guidelines**, between **intervention and control groups** at **baseline and follow up**.
- Quality health gain by describing the change in **patient health status** after the **intervention** as defined by **standard measures**, both general and conditions specific.
- Conduct an **economic evaluation** of the **medicines management intervention**.

SCOPE OF COMMUNITY PHARMACY

- In **processing prescriptions**
- **Clinical pharmacy**
- **Patient care**
- **Drug monitoring**
- **Extemporaneous preparation**
- **Alternative medicines**
- **Checking symptoms of minor ailments**
- **Health care professionals**

ROLES AND RESPONSIBILITIES OF COMMUNITY PHARMACIST

- Dispensing **prescription medicines** to the public.
- Ensuring that **different treatments are compatible**
- Checking **dosage** and ensuring that **medicines are correctly and safely supplied and**

labeled supervising the preparation of any medicines.

- Keeping a **register of controlled drugs** for **legal and stock control purposes**.
- **Liaising with doctors** about prescriptions
- Selling **over the counter medicines**.
- **Counseling and advising public** on the treatment of **minor ailments**.
- Advising patients of any **adverse side-effects of medicines**
- Measuring and fitting **compression hosiery**.
- **Monitoring blood pressure and cholesterol levels**.
- Offering a **diabetes screening service**.
- Arranging the **delivery of prescription medicines** to patients.
- **Managing, supervising and training pharmacy support staff**.
- **Budgeting and financial management**.
- Keeping up to date with **current pharmacy practice**, **new drugs** and their uses.

FINANCIAL

☐ FINANCIAL MANAGEMENT

- Financing is required to set up a new **community pharmacy** in order to **maintain the medicines and stock cover the expenses**.

❖ PURPOSE OF FINANCE

- To purchase **land, building, machinery and equipment**
- To purchase **raw materials and other materials**



- To pay **salaries, wages and incidental charges.**
- To maintain **stock and supply products**

❖ TYPES OF FINANCE

✓ Fixed capital

- Fixed / tangible assets that are free from **financial obligation or debts.**
- Invested in permanent assets such as **land and building, plant and machinery, furniture etc**

✓ Working capital

- Required for purchase and for **meeting day to day expenses** such as **wages, salary, rent, taxes etc.**
- It is either **fixed or variable.**

❖ SOURCES OF FINANCE

✓ Owned finance

- Generated by **owner, partner or shareholders.**
- As long as **business run** it remains and **surplus is returned to the shareholders.**

✓ Loan finance

- The capital is generated from **bank or other financial institutions**.
- Interest is **paid periodically at a fixed rate**, can be obtained against **mortgage or pledge of the property**.

MATERIALS

MATERIAL MANAGEMENT

- Material management is the **planning, directing, controlling and coordinating** the activities concerned with **material and inventory requirements** from the point of **their inception** to their introduction into the **manufacturing process**.

✓ It includes

- **Procurement of material**
- **Maintenance of stock**
- **Issuing, handling and transport**

STOCKING

✓ **Functions of stocking**

- **Receiving, handling and speedy issue of material**
- **Custodian of goods in store against damage**
- **To established regular supply of materials**
- **Physical stocking and its checking**
- **Efficient utilization of store space.**

- To **provide service to the organization in most economic way.**
- **Proper identification and easy location of items.**

✓ **Stocking of drugs in drug store**

- According to **manufacturer**
- According to **pharmacological action**
- **Alphabetical order**
- As per **old stock and date of expiry**

❖ **CODING OR CODIFICATION**

✓ **Advantages of codification**

- It helps in **easy identification of items.**
- It helps in **grouping the similar items together.**
- The **ambiguity in description of the materials** can be avoided.
- It helps in **avoiding duplication of items.**
- It helps in **physical counting.**
- It helps in **inspection of the materials.**
- The coding helps in **maintaining the secrecy of the items.**

✓ **Methods of codification**

- **Alphabetical order method / letter code**
- **Mnemonic method**

- Numerical method / sequence system method
- Combination method of alphanumerical method

✓ Location coding

1. Fixed location
2. Random location
3. Zonal location

STAFF

- The **management of staffing** is the process of **hiring and developing the required positions** in the organization.
- It involves the **scientific and systemic procurement, allocation, utilization, conversion and development of human resources**.

❖ FEATURES OF STAFF MANAGEMENT

- It is **continuous and persistent function**.
- It is an **integral part of the management process**.
- **Staff management** is a difficult process because, it deals with **human beings** who have their **own needs, emotions and aspiration**.
- It is concerned with the **HR of an organization**.

❖ IMPORTANCE OF STAFF MANAGEMENT

- Staffing helps to build the **healthy organization** in which the **job performance and satisfaction of every employee is high**.
- Staffs management inject life into of **organization** by providing the **right person for every job**.
- **Employees are the most important asset in the organization**.
- The **quality of the employees** decides the **future and scope of organization**.

INFRASTRUCTURE REQUIREMENTS

☐ SELECTION OF SITE

- Site is **well connected with various modes of transport**
- Surrounding should be **good ; no congestion of traffic**
- Site of the plot has a **sufficient scope for expansion**.

☐ LAYOUT OF STORE

- **Flexibility in arrangement**
- Convenience in **physical counting of materials**
- Items used sparingly should be **easy to locate**
- **Efficient protection against deterioration and pilferage of materials**.
- Better stock control but **minimum routine work like record**.
- Efficient use of **floor space and height**.
- **Safety from hazards , insurance etc**.
- **Proper illumination and ventilation**

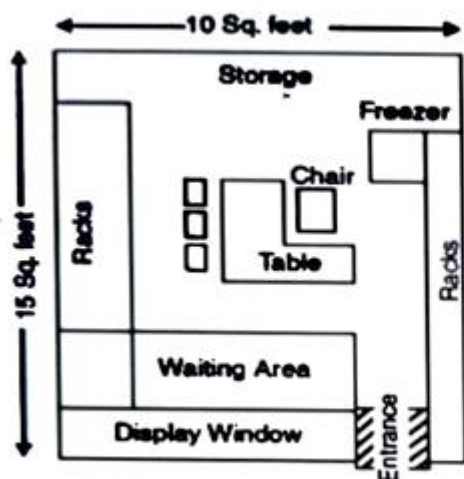
- **Shelves and bins** should not be **very deep**.
- **Minimum handling and transportation of materials.**

(Diagram labels – Retail drug store design)

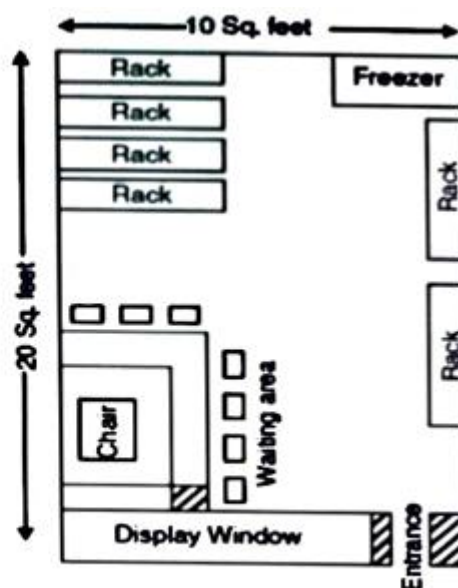
- 10 Sq. feet
- 15 Sq. feet
- Storage
- Freezer
- Rack
- Chair
- Table
- Waiting Area
- Display Window
- Entrance

(Diagram labels – Whole sale drug store design)

- 10 Sq. feet
- 20 Sq. feet
- Rack
- Freezer
- Chair
- Waiting area
- Display Window
- Entrance



Retail drug store design



Whole sale drug store design

❑ OBJECTIVES OD LAYOUT PLAN

- To attract **maximum** customers
- To **increase** purchase from each customer
- To **improve** general appearance and professional image
- To **maximize** utilization of space.
- To **reduce pilferage**, theft and provides surveillance
- To **control movement** inside the store.

Storage condition	Temperature in °c
Cold temperature	2 to 8
Cool temperature	8 to 25
Room temperature	25 to 30
Warm temperature	30 to 40
Excessive heat	Above 40
Controlled room temperature	15 to 30
Freezer	-20 to -10
Dry place	40 average relative humidity