

# PHARMACEUTICS – III

(Hospital & Community Pharmacy)



READING MATERIAL FOR PHARMACY  
TECHNICIAN STUDENTS

SECOND YEAR



# Reading Material

# PHARMACEUTICS-III (Hospital and Community Pharmacy)

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## PREFACE

Previously course contents of 02 years Pharmacy Technician Diploma Course approved by Pharmacy Council of Pakistan (PCP) were taught to the Pharmacy Technician students in PCP recognized Pharmacy Technician institutes/colleges in Punjab, AJK & Islamabad. Different reading materials of said course were prepared out of Pharmacy Council of Pakistan approved course contents by the owners / faculty of Pharmacy Technician Colleges and were available in the form of notes/hand books at respective Colleges / Institutions.

Under the dynamic vision and Leadership of Worthy Chief Minister Punjab, Khawaja Salman Rafique, Minister, Ali Jan Khan, Secretary, SHC&ME Department P&S Healthcare Department, took an innovative initiative to formulate a uniform reading material from the available PCP approved course contents of Pharmacy Technician Diploma course and PPC has officially developed a uniform reading material of Pharmacy technician course subject wise.

Punjab Pharmacy Council has reviewed, consolidated and presented a uniform Reading Material to be taught to Pharmacy Technician students in Punjab, AJK & Islamabad, as per College/Institute annual academic calendar to improve and ensure the provision of best quality of pharmacy education.

This official uniform reading material of each subject of PCP approved 02 years Pharmacy Technician Diploma Course is available in the form of official hand book subject wise at Punjab Pharmacy Council and shall be taught to students in PCP recognized Pharmacy Technician Colleges/Institutes in Punjab, AJK & Islamabad with immediate effect. PPC technician examinations will also be taken out of this official uniform reading material and contents of Pharmacy Technician Diploma Course.

**Prof. Dr. Zaka-ur-Rehman**  
**PhD, L.L.B**  
**Secretary**  
**Punjab Pharmacy Council**



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## CHAPTER 1

### INTRODUCTION OF HOSPITAL PHARMACY

#### **Hospital**

The hospital is a healthcare unit, which incorporates a combination of specialized scientific equipments and functioning through trained and certified healthcare professionals working as a team for the common purpose of providing medical services to the population.

#### **Hospital Pharmacy:**

Hospital pharmacy is a department or service in a hospital, responsible for the supply of medications to hospital wards as well as to the ambulatory patients.



The department is headed by professionally competent, legally qualified pharmacist, who directly supervises and ensures the correct dispensing, compounding, and distribution of medication to in and outpatients.

#### **Aims & Objectives of Hospital Pharmacy:**

- To provide quality assurance for manufacturing, assembling and purchase of pharmaceuticals.
- To purchase and supply of drugs for inpatients, outpatients, hospital employees and for purpose of clinical drug trails.
- Maintain patient's medication profiles.
- Maintain prescription records.



- Provide information related to drugs and drug therapy to doctors, nurses, medical and nursing students and other staff.
- Coordinate and control all drug delivery and distribution systems.
- To supervise the activities of pharmacy technicians.

## CHAPTER 2

### HOSPITAL AND ITS ORGANIZATION

Different hospital has different management systems. In government hospital, medical superintendent who is appointed by ministry of health manages the hospital. Military hospital is managed by commanding officer, while a private hospital usually has an organized governing body, which is responsible for managing all hospital activities. Common hospital organization consists of...

- Administration
- Director
- Medical staff, e.g. active, associate, consulting, honorary

#### **2.1 CLASSIFICATION OF HOSPITALS:**

Hospitals may be classified in number of ways. A hospital may fall into more than one group. Hospitals usually are distinguished from other types of medical facilities by their ability to admit and care for inpatients while the others often described as clinics. Following is a general classification of hospitals:

##### **2.1.1 Classification of Hospitals Based on Services:**

###### **2.1.1.1 General Hospital**

The best-known type of hospital is the general hospital, which is set up to deal with many kinds of disease and injury, and normally has an emergency department to deal with immediate and urgent threats to health. Larger cities may have several general hospitals of varying sizes and facilities.

###### **2.1.1.2 Specialized Hospitals:**

Types of specialized hospitals include

- Children's hospitals
- Seniors hospitals

- Psychiatric hospital
- Cardiac hospital
- Cancer hospital
- Surgical hospital
- Trauma centers
- Rehabilitation hospitals

A hospital may be a single building or a number of buildings on a campus. Most hospitals are run on a nonprofit basis by governments or charities.

#### **2.1.1.3 Teaching Hospital:**

A teaching hospital provides clinical instructions to medical students and nurses and often is linked to a medical school, nursing school or university.

#### **2.1.1.4 District Hospital:**

A district hospital typically is the major health care facility in its region, with large numbers of beds for intensive and long-term care.

#### **2.1.1.5 Clinics:**

The medical facility smaller than a hospital is generally called a clinic, and is often run by a private partnership of physicians. Clinics generally provide only outpatient services.

#### **2.1.2 Classification of Hospitals based on ownership and control:**

- Governmental hospitals, e.g. teaching hospital, military hospitals, federal governmental hospital, provincial governmental hospital
- Non-governmental hospital
- Private for profit hospital
- Private for non-profit hospital, e.g. charity hospital, trust hospital



## **2.2 CLINICAL DEPARTMENTS:**

Hospitals vary widely in the services they offer and therefore, in the departments (or "wards") they have. They may have acute services such as an emergency department or specialist trauma center; burn unit, surgery, or urgent care. Most important and common clinical departments of a hospital are listed below:

### **2.2.1 Surgery Department:**

This department deals with the removal or replacement of a diseased-organ or tissue or removal of an organ for preventive purposes, we can say this department deals with cutting the body open to remove a tumor or repair an injury.

### **2.2.2 Gynecology Department:**

This department deals with the functions and diseases specific to women and girls, especially those who have reproductive system problems.

### **2.2.3 Orthopedic Department:**

Orthopedic departments treat problems that affect your skeletal system e.g. joints, bones. The doctors and nurses who run this department deal with everything from settling bone fractures to carrying out surgery.

### **2.2.4 ENT Department:**

The ENT department provides care for patients with a variety of problems e.g general ear, nose and throat diseases, tear duct problems, balance and hearing disorders, ENT allergy problems, salivary gland diseases, voice disorders.

### **2.2.5 Cardiology Department:**

This department provides medical care to patients who have problems with their heart or blood circulation. It treats people on an inpatient and outpatient basis.

### **2.2.6 Dermatology Department:**

This department deals with diagnosis and treatment of skin related diseases.

### **2.2.7 Neurology Department:**

This department deals with disorders of the nervous system, including the brain and spinal cord. It runs by doctors who are specialized in this area (neurologists) and by their staff.

### **2.2.8 Urology Department:**

The urology department runs by urology surgeons and their surgical team. It investigates all areas linked to kidney and bladder-based problems.

### **2.2.9 Pharmacy Department:**

The hospital pharmacy run by pharmacists, pharmacy technicians and attached staff. It's responsible for drug-based services in the hospital.

## **2.3 IMPORTANT HOSPITAL SERVICES:**

### **2.3.1 Nursing Services:**

Nursing Services are provided by licensed nursing personnel in a hospital. They are responsible for management of health care, guidance and counseling of individuals and families during acute and chronic phases of illness.

### **2.3.2 Dietetic Services:**

Dietitians are experts in food and nutrition ("dietetics"). In a hospital, they advise people on what to eat in order to lead a healthy lifestyle or to achieve a specific health-related goal.

### **2.3.3 Pathology Services:**

Pathology is the study and diagnosis of disease through examination of molecules, cells, tissues; body fluids e.g. blood tests, urine tests. Pathology Services are very important health care services provided to patients. The majority of Pathology work is laboratory-based.



### **2.3.4 Blood Bank Services:**

The blood banks are laboratories within the hospital that store and distribute blood products to clinical departments in hospitals. This might involve testing of the patient to ensure the blood product is suitable for their use.

### **2.3.5 Radiology Services:**

These services deal with X-rays and other high-energy radiation for the diagnosis and treatment of disease.

## **2.4 PHARMACY ROLE IN THE HOSPITALS**

### **2.4.1 Administrative services:**

1. Plan and coordinate departmental activities.
2. Develop policies.
3. Schedule personnels and provide supervision.
4. Coordinate administrative needs of the pharmacy and therapeutics' committee.
5. Develop proper inventory control techniques.

### **2.4.2 In-Patients Services:**

1. Provide medications for all in-patients of the hospital on 24 hours basis.
2. Inspection and control of drugs in all treatment areas.
3. Cooperate with investigational use of drugs.
4. Maintain patients' medication profiles.
5. Exercise proper control in dispensing of narcotics and other controlled substances.

### **2.4.3 Out-Patients Services:**

1. Review prescriptions and dispense with proper directions of use to outpatient.
2. Inspect and control all clinics and emergency service medication stations.
3. Maintain prescription records.

**2.4.4 Drug Information Services:**

1. Provide information on drugs and drug therapy to doctors, nurses, medical and nursing students and the house staff.
2. Maintain an up to date drug information center.
3. Prepare the hospital's pharmacy newsletter.
4. Maintain literature files.

**2.4.5 Education & Training Services:**

1. Coordinate programs of under graduate and graduate pharmacy students.
2. Participate in hospital wide educational programs involving nurses' doctors etc.
3. Train newly employed pharmacy department personnel.

**2.4.6 Departmental Services:**

1. Coordinate and control all drug delivery and distribution systems.
2. Control and dispense narcotics and controlled substances.
3. Control and dispense intravenous fluids.

**2.4.7 Purchasing & Inventory Services Control**

1. Purchase of drugs.
2. Receive, store and distribute drugs.
3. Maintain drug inventory control.
4. Interview drug house representatives, extract useful information's and circulates it to concerned personnel.

**2.4.8 Manufacturing & Packaging Service**

1. Manufacture wide variety of items for common use at the hospital.
2. Operate an overall drug packaging and pre-packaging program.



## CHAPTER 3

### AN INTRODUCTION TO THE HOSPITAL FORMULARY

#### **HOSPITAL FORMULARY:**

A continually revised compilation of approved pharmaceuticals, plus important ancillary information, which reflects the current clinical judgment of the institution's medical staff.

#### **Advantages of Formulary:**

- Therapeutics Advantages
- Economic Advantages
- Educational Advantages

#### **Therapeutics Advantages:**

The formulary provides greatest benefit to patient and physician in such a way that only the most efficient products are listed in hospital formulary and available in hospital.

#### **Economic Advantages:**

Hospital formulary system provides most therapeutically effective drugs at most economical cost.

#### **Educational Advantages:**

Hospital formulary also contains some special information, prescribing tips, which are useful for medical staff from educational point of view.

#### **Disadvantages of Hospital Formulary:**

This system deprives the physician to prescribe and obtains the brand of his choice.

This system permits the pharmacists to act as a sole judge.

Does not reduce the cost as large volume purchase take place.



### **Contents of Formulary:**

Hospital formulary consist of three parts....

**Part-1:** Information on hospital policies and procedures

**Part-2:** Drug product listing

**Part-3** Special information e.g. nutrition products, hospital abbreviations etc

## CHAPTER 4

# DISPENSING TO INPATIENTS AND OUTPATIENTS

### 4.1 INPATIENT:

A patient who stays in a hospital while under treatment overnight or for an undetermined time, usually several days is called inpatient. Treatment provided to it, is called inpatient care.

### 4.2 OUTPATIENT:

A patient who receives medical treatment without being admitted to a hospital is called outpatient. Treatment provided to it, is called ambulatory care.

### 4.3 DISPENSING:

Dispensing is a pharmacy act and consists of the removal of two or more doses from a bulk drug container and placing them in another individual container/ envelop for subsequent use by a patient.

#### 4.3.1 Dispensing to Inpatients:

The prescription to inpatients is called medication order. Nurse carries out these medication orders and obtain required drugs from pharmacy. In the pharmacy, these required drugs might have to be prepackaged in proper quantities for use by the nurse to administer to patient, compounded or manufactured and labeled properly.



At nursing station, the drugs are stored again for continuous use by patients according to physician's orders. The nurse prepares drugs for administration, brings it to the patients, returns to the nursing unit and records this information on the patient's record.

**(Note:** for more detail about dispensing to inpatients, see the topic "Distribution of hospital medicines")

#### **4.3.2 Dispensing to Outpatients:**

It is always preferable to have a separate out-patient pharmacy. When this is not possible units are combined and the services provided from the same or separate window from same pharmacy. There is no general rule regarding location of outpatient pharmacy.

The hospitals breakdown their outpatients (ambulatory patients) load into three categories

- Primacy care
- Emergency care
- Referral or tertiary care

##### **4.3.2.1 Primacy care:**

This care is used by most of people, at most of the time for most of their minor health problems. It is provided to the patients as an entry point into a comprehensive healthcare system.

##### **4.3.2.2 Emergency care:**

In this dispensing, comprehensive care provided to patients in emergency situation.

##### **4.3.2.3 Referral or tertiary care:**

After the diagnosis or treatment in primacy care or emergency care stage, if doctors feel that this patient need special type of treatment and this facility is not present in this hospital, they refer patient to other specific hospital for further or complete treatment.



### 4.3.2 Location of Outpatient Dispensing Area:

#### 4.3.2.1 Independent Outpatient Pharmacy:

A separate setup with specialized function for provision of outpatient pharmaceuticals services operating under the main pharmacy. This pharmacy is established whenever outpatient department and pharmacy are widely separated.

#### 4.3.2.2 In and Outpatient Combined Pharmacy:

In combined pharmacy, dispensing for the both in-and-outpatient carried out. In-and – out patient can be served from the same window of the pharmacy or the window can be separate.



#### 4.3.3 Prescription types received in outpatient Pharmacy:

This type of dispensing depends on hospital rules, kind of hospital and location of the outpatient pharmacy departments.

Generally Received Prescriptions include...

- Clinic patients
- Discharged hospital patients
- Employees of hospitals
- Private patients

## CHAPTER 5

### SAFE USE OF MEDICATION IN THE HOSPITAL

Pharmacists in hospitals and health systems play an important role in preventing medication errors. They make sure you use medicines safely and effectively. A pharmacist has a moral, legal and professional duty for safe drug use in a hospital. Safe use of drugs encompasses an error free medication without occurrence of any drug interaction, adverse drug reaction and drug toxicity.

Clearly defined hospital policies regarding dispensing or distribution of drug products ensure safe medication in institution. Hospital pharmacist is in the best position to judge, and is responsible for development of required policies regarding handling, storage, administration or dispensing of drugs and related products.



#### **Following recommendations must be consider for safe use of medication in hospitals:**

- **Medication errors**
- **Lack of personnel (Pharmacist)**
- **Wrong Labels on medicines**
- **Inadequate drug stations on patient care area**
- **Interactions**
- **Storage**

### 5.1 MEDICATION ERRORS:

A medication error simply is deviation of a medication dose from the physician's order or prescription. In broad terms, medication error is administration of a wrong medicine, dose, and diagnostics or to wrong patient. It also includes failure to administer prescribed medication. The therapeutically inappropriate drugs or dose (therapeutic errors) are excluded from the definition of the medication errors.

#### Followings Are Major Medication Errors:

- **Omission error** e.g. failure to administer the physician's ordered dose, by nurse like less than prescribed dose.
- **Unauthorized drug error** e.g. administration of drug to a wrong patient, duplication of doses or unordered drug
- **Wrong dose error** e.g. above or below than the ordered dose
- **Wrong route error** e.g. administration of drug through IM instead of IV route or any other route
- **Wrong site error** e.g. instilling of drug into left ear instead of right ear
- **Wrong rate error** e.g. speeding up the infusion instead of slow rate
- **Wrong time error** e.g. administration of drug after every 4-hours instead of 6-hours
- **Wrong preparation error** e.g. wrong dilution, not shaking a suspension

### 5.2 LACK OF PERSONNEL (PHARMACIST):

The medical care without a pharmacist may lead into serious medication errors. A pharmacist checks prescription to ensure the safe use of medication in hospitals.

### 5.3 WRONG LABELS ON MEDICINES:

Wrong labeling can lead to serious health problems. Always keep medicines in their original container and do not remove the label. Do not share medicines. The label should tell you and to patient that...

- How much medicine to use (e.g. take one tablet or inhale two puffs)



- How often it should be used (e.g. twice a day or every six hours or at night)
- How long to use it for, if for short term treatment (e.g. for five days)
- How to use a medicine that is not swallowed (e.g. apply to the skin)

#### **5.4 INADEQUATE DRUG STATIONS ON PATIENT CARE AREA:**

Lack of facilities like inadequate space, poor lighting, improper storage of drugs and area contribute to medication errors.

#### **5.5 INTERACTIONS:**

Some medicines can interact with other medicines so that they don't work as well or cause unpleasant or harmful effects. Some medicines can also interact with food. Doctor or pharmacist should inform to the patient which foods to avoid while taking the medicine.

#### **5.6 STORAGE:**

To prevent accidental poisonings, store all medicines out of reach and sight of unauthorized persons.

It is important that medicines are stored correctly so that they don't degrade and lose their effectiveness. Unless stated on the label, store medicines in a dry, cool place.

## CHAPTER 6

# INTRODUCTION TO DISTRIBUTION AND CONTROL OF HOSPITAL MEDICINES

### **6.1 DISTRIBUTION OF HOSPITAL MEDICINES:**

Traditional methods of distributing drugs in hospitals are now undergoing reevaluation, and considerable thought and activity is being directed toward the development of new and improved drug distribution systems.

The hospital pharmacy shall be responsible for the receiving, distribution, and control of all drugs used within the hospital. There are four systems used for drug distribution in a hospital. They may be classified as follows...

1. Individual Prescription Order System
2. Complete Floor Stock System
3. Combination of (i) and (ii)
4. The unit dose method

#### **6.1.1 Individual Prescription Order System:**

This system is generally used by the small and private hospital because of the reduced manpower requirement and the desirability for individualized service.

#### Advantages of this System:

- The pharmacist directly reviews all medication orders.
- Provides for the interaction of pharmacist, doctor, nurse and patient.
- Provides closer control of inventory.

### **6.1.2 Complete Floor Stock System:**

Under this system, the nursing station pharmacy carries both “charge” and “non-charge” patient medications. This system is used most often in governmental and other hospitals in which charges are not made to the patient or when the all-inclusive rate is used for charging.

For this system, the two ways are currently in use one is under supervision of nurse at nursing station and under supervision of pharmacist in hospital pharmacy.

### **6.1.3 Combination of Individual prescription order system and complete floor stock system [Combination of (i) and (ii)]:**

This system utilizes simultaneously an individual drug order system as primary means of dispensing along with a limited floor stock system. This combination system is probably the most commonly used in hospitals today and is modified to include the use of unit dose medications.

### **6.1.4 The Unit Dose Method:**

Unit-dose medications are those medications, which are ordered, packaged, handled, administered and charged in multiples of single dose units containing a predetermined amount of drugs or supply sufficient for one regular dose application or use.

#### Advantages of Unit Dose System:

- Patients receive improved pharmaceutical service 24 hours a day.
- All doses of medication required at the nursing station are prepared by the pharmacy thus allowing the nurse to have more time for direct patient care.
- Allow the pharmacists to check a copy of the physician’s original order thus reducing medication errors.
- Eliminate duplication of orders and paper work at the nursing station and pharmacy

## **6.2 CONTROL OF HOSPITAL MEDICINES:**

Drug control is among the pharmacist's most important responsibilities. Therefore, adequate methods, to assure that these responsibilities are met must be developed and implemented.

## **6.3 HOSPITAL/ PHARMACY POLICIES AND PROCEDURES:**

Drug control begins with the setting of policy. The effectiveness of the drug control system depends on the policies and procedures (detailed guidelines for implementing policy). All pharmacy staff must be familiar with the manual.



## **6.4 STANDARDS, LAWS, AND REGULATIONS:**

The pharmacist must be aware of and comply with the laws, regulations, and standards related to the drug control.

## **6.5 RECORDS KEEPING:**

The pharmacist must establish and maintain adequate record keeping systems. Various records must be retained by the pharmacy because of governmental regulations; some are advisable for legal protection, and for sound management (evaluation of productivity, workloads, and expenses and assessment of departmental growth and progress) of the pharmacy department. Records must be retained for at least the length of time prescribed by law.

## **6.6 DRUG STORAGE AND INVENTORY CONTROL:**

Storage is an important aspect of the total drug control system. Proper environmental control (i.e., proper temperature, light, humidity, conditions of sanitation and ventilation) must be maintained wherever drugs and supplies are stored in the institution. Safety also is an important factor, and proper consideration should be given to the safe storage of poisons and flammable compounds.

## CHAPTER 7

## AN INTRODUCTION TO HEALTH ACCESSORIES AND SURGICAL SUPPLIES

Knowledge of health accessories and surgical instrument is very important for a pharmacist and pharmacy technicians working in a hospital. Pharmacist is expected to handle the surgical instruments at the drug store or in a hospital.

### 7.1 HEALTH ACCESSORIES:

Health Accessories are very useful for our health, it can prove very effective at the time when we need urgent medical treatment at home. Some important health accessories are listed below...

- First aid kit
- Dressing
- Stethoscope
- Thermometer
- BP apparatus
- Glucose testing apparatus
- Hospital beds
- Towels & washcloths
- Blankets
- Walker
- Wheel chairs
- Bathroom safety equipments
- Nebulizers
- Patient lifter





## 7.2 SURGICAL SUPPLIES:

These are instruments used in general surgery in a hospital.  
These may include...

### 7.2.1 Surgical Dressing:

These may include the dressings of wounds, for support and protective purpose. These are cotton, plain gauze, film dressing, adsorbents, bandages, adhesive tapes etc.



### 7.2.2 Operation Theater Supplies:

- Operating table
- Operating room lights
- Anesthesia machine
- Sterile instruments
- Electronic blood pressure measuring machine
- Electronic heart rate monitor
- Electronic respiratory rate monitor
- Protective cap
- Masks
- Vinyl gloves on their hands
- Long gowns
- Protective shoe covers



### 7.2.3 Sutures and Ligatures:

These are fibers used to hold wounded edges with the help of needle for the purpose of repairing of wounds. These may include the surgical needles, clamps, clips, catgut, and polymer polyester.

## CHAPTER 8

GENERAL INTRODUCTION TO COMMUNITY PHARMACY**COMMUNITY PHARMACY:**

A community pharmacy is a pharmacy that deals directly with people in the local area. It has responsibilities including compounding, counseling, checking and dispensing of prescription drugs to the patients with care, accuracy, and legality.

It is an important branch of the pharmacy profession and involves a registered pharmacist (known as community pharmacists) with the education, skills and competence to deliver the professional service to the



community. Under pharmacist supervision pharmacy technician's supply medicines to patients, assemble medications for prescription and provide information to patients and other healthcare professionals.

Community pharmacists have always played a significant role in promoting, maintaining and improving public health.

Community Pharmacists are generally divided into two categories, those who practice in independent pharmacies and those who practice for chain store pharmacies.

### Scope of Community Pharmacy:

Community pharmacists are the health professionals most accessible to the public. They supply medicines according to prescription & also cover counseling of patients at the time of dispensing to give drug information. The main activities of community pharmacist are...



- Processing of prescription
- Care of patient (in clinical pharmacy)
- Extemporaneous preparation
- Informing health care professional and the public
- Health promotions

## CHAPTER 9

PUBLIC HEALTH AND COMMUNITY PHARMACY

Public health is the study and practice of improving the overall health, and health gains, of populations rather than individuals.

Pharmacists can apply their pharmaceutical skills, knowledge and resources to promote these objectives



with the aim of defining, addressing and monitoring the real health needs of the population.

**9.1 EPIDEMIOLOGY AND ITS CONTROL:**

The study of the nature, cause, control, and determinants of the frequency and distribution of disease, disability, and death in human populations is called epidemiology.

Epidemiology is a set of tools for understanding the burden and causes of health problems in human populations to decrease risk and improve health.

**9.1.1 Major Purposes of Epidemiology:**

1. To investigate health-related problems in the community.
2. To identify causes and risk factors e.g., what factors increase the risk of heart disease, automobile accidents
3. Describing the natural history of disease
4. Establishing the history of a disease in a population
5. Describing the clinical picture of disease; i.e., who gets the disease, who dies from the disease, and what the outcome of the disease is

6. Identifying syndromes and precursors; e.g., the relationship of high blood pressure to stroke
7. To provide foundation for health public policy

## **9.2 PREVENTION HEALTH (EPI AND CDC):**

It is identification and minimizing the risk factors for disease, improves the course of an existing disease and screening for early detection of disease. Its also includes public health achievements, such as vaccination programs and control of many infectious diseases including polio, diphtheria, yellow fever and smallpox etc.

### **9.2.1 Communicable Disease Control (CDC):**

#### **Communicable Disease:**

Diseases, which are transmitted directly or indirectly from one person to another, are called communicable diseases.

These diseases can be prevented by practicing hygiene and improving the living standard of general public. A pharmacist being in direct contact with the general public is in a better



position to educate the people about the general aspects of communicable diseases, their causes, how these diseases spread, their prevention and control.

#### **Some common communicable diseases in Pakistan are...**

Communicable diseases remain a major public health concern in Pakistan. Pakistan is at high risk of epidemics (widespread occurrence of an infectious disease in a community at a particular time) because of overcrowded cities, unsafe drinking water, inadequate sanitation, poor socioeconomic conditions, low health awareness and inadequate vaccination coverage. Some common communicable diseases are...

- **Chickenpox**
- **Influenza**
- **Tuberculosis**
- **Hepatitis**
- **Measles**
- **AIDS**



### **Mode of Transmission of Communicable Diseases:**

There are many ways in which the communicable diseases may be transmitted. Communicable diseases may be transmitted by direct or indirect methods depending on the infectious agent.

Direct contact is established through touching; kissing, speaking, handshakes. Infection may be transmitted indirectly through vehicles, food, fluid or any other thing that an infected person used. These diseases are also transmitted through droplets of saliva, cough, sneezing or speaking.

### **Control and Prevention of Communicable Diseases:**

There are three essential components in the chain of infection, source or reservoir, mode of transmission and susceptible host. Disease control involves all the measures designed to prevent or reduce the incidence of disease.

### **Controlling the Reservoir:**

The simplest method of controlling a disease would be elimination of reservoir or source whenever possible by early diagnosis or isolation or limitation of movement of infected person.

**Interruption of Transmission:**

In this method we break the chain of transmission to control the disease.

**The Susceptible Host:**

The susceptible host or people at risk can be protected by immunization (EPI) or chemoprophylaxis.

**9.2.2 Extended Program on Immunization (EPI):**

The expanded Program on Immunization (EPI) is a disease prevention activity aiming at reducing illness, disability and mortality from childhood diseases preventable by immunization.

Prevention of diseases is the need of the day. The rising costs of treating the diseases require us to focus more on their prevention. Immunization is among the most successful components or preventive medicine.

Pakistan has made significant improvement in EPI coverage in comparison to India and Afghanistan, but has to adopt a more aggressive implementation strategy to compete with other countries of the region.



Following is the immunization schedule for infants and children of Pakistan...

S. No.	AGE	NAME OF VACCINE	DOSE	ROUTE	AGE	GIVEN ON	DUE ON	NURSE SIGN.
1	Birth	1. BCG 2. OPV	1. 0.05 ml (0-3 mo) 0.1 ml (> 3 mo) 2. 2 drops	1. Intradermal (preferred deltoid) 2. PO				
2	6 Weeks	1. (DPT-HepB-Hib) 2. OPV 3. PCV*	1. 0.5 ml 2. 2 drops 3. 0.5 ml	1. IM 2. PO 3. IM				
3	10 Weeks	1. (DPT-HepB-Hib) 2. OPV 3. PCV* 4. ROTAVIRUS*	1. 0.5 ml 2. 2 drops 3. 0.5 ml 4. 1 ml	1. IM 2. PO 3. IM 4. PO				
4	14 Weeks	1. (DPT-HepB-Hib) 2. OPV 3. PCV* 4. ROTAVIRUS*	1. 0.5 ml 2. 2 drops 3. 0.5 ml 4. 1 ml	1. IM 2. PO 3. IM 4. PO				
5	9 Months	1. MEASLES	1. 0.5 ml	1. SC				
6	12 Months	1. Hepatitis A* 2. Chicken Pox *	1. 0.5 ml 2. 0.5 ml	1. IM 2. SC				
7	15 Months	1. MMR** 2. PCV*	1. 0.5 ml 2. 0.5 ml	1. SC 2. IM				
8	18 Months	1. DTaP+Hib** 2. OPV 3. Hepatitis A*	1. 0.5 ml 2. 2 drops 3. 0.5 ml	1. IM 2. PO 3. IM				
9	> 2 Years	1. Typhoid*	1. 0.5 ml	1. IM				
10	4-5 Years	1. DTaP* 2. Chicken Pox* 3. OPV	1. 0.5 ml 2. 0.5 ml 3. 2 drops	1. IM 2. SC 3. PO				
11	5-7 Years	1. MMR*	1. 0.5 ml	1. SC				
12	10-15 Years	1. TT 2. MMR***	1. 0.5 ml 2. 0.5 ml	1. IM 2. SC				

\* These vaccines are not supported by the National Expanded Programme for Immunisation (EPI), but are strongly recommended.

\*\* These vaccines are not included in National EPI but are very strongly recommended.

\*\*\* To be administered only if no evidence of second MMR administration age 5-7 years.



### 9.2.2.1 Family Planning:

Family Planning is process of choosing the number of children in a family and the duration of time between their births. Men and women in Pakistan “women especially” are poorly informed about family planning. Most of the women don’t have idea about family planning, 76% of women in Pakistan are illiterate.



The Pakistani nation is among the fastest growing nations in the world today. Effort to improve the health quality of mothers and children and reduction in the number of children per mother are some of the important developments in the various family planning programs introduced in Pakistan. The family planning policies are focusing on creating a balance between an increase in the resources and a reduction in the population so as to achieve a balance between the resources and the consumers.

There are many challenges to population planning implementation in Pakistan. In Pakistan, the cultural and religious institutions consider family planning a very wrong deed and have been fiercely resistant to this trend. The people follow this social pressure instead of considering their own health, resources and limitations.

#### Methods of Birth Control:

Methods	Effectiveness	Benefits	Risk
Birth control pill	95%	Some protection against ovarian cancer	Not effective against transmission of sexually transmitted infections (STI)
Cervical cap	60% to 80%	Can last for one to two years	Not effective against STI
Contraceptive injection	99%	Effective for one to three months	Not effective against STI
Diaphragm	80%	Can last for one to two years	Not effective against STI
Intrauterine device (IUD)	96%	Effective one to ten years	Not effective against STI
Male condom	86%	Reduce the risk of many STI Available over-the-counter Inexpensive	Lessens sensation May break during intercourse

**Need of Family Planning:**

1. To improve economic condition
2. To improve health of mothers
3. To improve care towards children that parents already have
4. To make equal resources to needs
5. To ensure environmental stability
6. To achieve universal primary education

**Islamic Point of view about Family Planning:**

Islam focuses the wellbeing of children. The presence of a nursing infant was a major reason for birth control. A new pregnancy set an upper limit on lactation length, resulting in palpable harm to the child being nursed. Even the Quran impliedly supports age difference between children: "And mothers shall suckle their children two full years to complete breast feeding."

**9.3 HEALTH POLICY AND NATIONAL DRUG POLICY OF PAKISTAN:****Health Policy of Pakistan:**

Pakistan is committed to the goal of "health for all" by the year 2000, which was inspired by the principle of social equity. To achieve this, the government is taking all possible measures in the field of health services at large and drugs in particular. Formulation of the national drug policy thus forms an integral component of its national health policy. Purpose of which is to ensure regular availability of essential drugs of acceptable efficacy, safety and quality at affordable price.



### Specific Objective of the National Drug Policy of Pakistan:

- To develop and promote the concept of essential drugs and to ensure regular, uninterrupted and adequate availability of such drugs of acceptable quality and at reasonable prices.
- To incorporate the concept of rational use of drugs with a view of safeguarding public health from over-use, miss-use or inappropriate use of drugs in all health related sectors and persons.
- To encourage the availability and accessibility of drugs in all parts of the country with emphasis on those, which are included in the National Essential Drugs List.
- To attain self-sufficiency in formulation of finished drugs and to encourage production of pharmaceutical raw materials by way of basic manufacture of active ingredients.
- To protect the public from hazards of substandard, counterfeit and unsafe drugs.
- To develop adequately trained manpower in all fields related to drugs management.
- To develop a research base particularly for operational and applied research with a view of achieving the above mentioned objectives.
- To develop the pharmaceutical industry in Pakistan with a view of meeting the requirement of drugs within the country and with a view of promoting their exports to other countries.



## CHAPTER 10

# PHARMACY LAYOUT AND DESIGN

### **10.1 PHARMACY LAYOUT:**

Pharmacy layout is the components of the physical facilities of a pharmacy. Layout is the space allocation and arrangement of drugs in drug store

### **10.2 PHARMACY DESIGN:**

Pharmacy design is the internal and external appearance of a pharmacy.

### **10.3 OBJECTIVES OF PHARMACY LAYOUT AND DESIGN:**

Pharmacy layout and design are the major factors contributing to a pharmacy's success. The exterior appearance of a pharmacy attracts consumer's attention. The purpose of interior design is to enhance the general appearance of pharmacy and to project a professional image.



Main objectives of proper layout design of a retail drug store and wholesale drug store are listed below...

- To project a professional image and improve general appearance
- To minimize the movement of customers within the premises of the drug store
- To attract a large number of customer
- To increase the sale of a store

- To reduce the selling expenses to a minimum
- To provide the customer satisfaction
- To have a space for reserve-stock, office and resting place for the employees
- To have a proper entrance for coming goods

#### 10.4 TYPES OF LAYOUT DESIGNS:

##### 10.4.1 Personal Service:

In this type of layout design, only pharmacist gives drugs to the customers

##### 10.4.2 Self-Selection:

In this type of layout style, products are displayed in a manner that the consumers may see, handle, and select items themselves.



##### 10.4.3 Self Service:

This type of layout is most often used in super drug store but for the non-drug items and commodities such as cosmetics and nutritional supplements.

#### 10.5 STYLE OF LAYOUT DESIGN:

Two most common layout styles are used in internal arrangement of fittings and racks.

These are...

- **Grid layout**
- **Free-flow layout**

##### 10.5.1 Grid Layout:

In the grid layout design, all fittings and counters are installed at the right angle to one another. The products are displayed in straight and parallel lines. Advantages of grid layout

style are, more products exposure, ease in cleaning, and maximum utilization of available space.

### **10.5.2 Free-Flow Layout:**

In free-flow style, fixtures are irregularly shaped, such as circles, arches, and triangles. This layout style allows an unstructured flow of customer traffic. Free wandering of customer encourages more purchasing as compared to grid layout.

## **10.6 TYPES OF PHARMACIES:**

Following listed below are the major types of pharmacies...

- Community pharmacy
- Hospital pharmacy
- Clinical pharmacy
- Ambulatory care pharmacy
- Compounding pharmacy
- Consultant pharmacy
- Internet pharmacy
- Veterinary pharmacy
- Nuclear pharmacy
- Military pharmacy

### **10.6.1 Community Pharmacy:**

A community pharmacy is a pharmacy that deals directly with people in the local area (Commonly known as chemist, drugstore, or retail pharmacy).

### **10.6.2 Hospital Pharmacy:**

Hospital pharmacy is a department or service in a hospital, responsible for the dispensing, compounding and supply of medications to hospital wards as well as ambulatory patients.

**10.6.3 Clinical Pharmacy:**

Clinical pharmacy is the branch of Pharmacy where pharmacists provide patient care that optimizes the use of medication and promotes health, wellness, and disease prevention. Clinical pharmacists are experts in the therapeutic use of medications.

**10.6.4 Ambulatory Care Pharmacy:**

Ambulatory care pharmacy is based primarily on pharmacotherapy services (Medical treatment by means of drugs) that a pharmacist provides in a clinic. Pharmacists in this setting often do not dispense drugs, but rather see patients in office to manage chronic disease states.

**10.6.5 Compounding Pharmacy:**

Compounding pharmacies are specialized in compounding (preparing drugs in new forms or mixing different drugs), although many also dispense the same non-compounded drugs that patients can obtain from community pharmacies.

**10.6.6 Consultant Pharmacy:**

Consultant pharmacy practice focuses more on medication procedure review than on actual dispensing of drugs.

**10.6.7 Internet Pharmacy:**

Internet pharmacies (Online pharmacies, Mail Order Pharmacies) are pharmacies that operate over the Internet and send the orders of drugs to customers through the mail or shipping companies.

**10.6.8 Veterinary Pharmacy:**

Veterinary pharmacies, sometimes called animal pharmacies stock different varieties of medications to fulfill the pharmaceutical needs of animals.

### 10.6.9 Nuclear Pharmacy:

Nuclear pharmacy focuses on preparing radioactive materials for diagnostic tests and for treating certain diseases. Nuclear pharmacists undergo additional training specific to handling radioactive materials, and unlike in community and hospital pharmacies, nuclear pharmacists typically do not interact directly with patients.

### 10.6.10 Military Pharmacy:

A military pharmacy is a pharmacy, which meets the needs of a military health care system. Military pharmacies dispense medications to members of the military, their dependents, and military retirees.

## 10.7 CONSUMER GOODS AND PURCHASES:

Goods that are ready for consumption for human satisfaction, and are not utilized in any further production are called consumer goods. Listed below are some common consumer goods that may be available at pharmacies or medical stores and can be purchased from manufacturer or wholesaler.



- Baby Care
- Women's Health
- Skin & Hair Care
- Self-Measured Blood Glucose Monitors
- Insulin Delivery Devices
- Diagnostic Tools
- Surgical Instruments
- Cosmetics
- Skin care
- Insect repellents
- Infant formulas
- Food supplements



## CHAPTER 11

MANAGEMENT OF PHARMACEUTICAL AND HOSPITAL WASTE**11.1 PHARMACEUTICAL WASTE:**

Pharmaceutical waste includes expired, unused, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer required and need to be disposed of appropriately.

**11.2 HOSPITAL WASTE:**

Hospital waste is any waste, which is generated in the diagnosis, treatment or immunization of human beings or animals or in research in a hospital.

Total amount of waste generated by health-care activities, include about 80% general waste. The remaining 20% is considered hazardous material that may be infectious, toxic or radioactive. Health-care waste contains potentially harmful microorganisms, which can infect hospital patients, health-care workers and the general public.

Health-care waste includes all the waste generated by health-care establishments, research facilities, and laboratories.

**11.3 COMMON PHARMACEUTICALS WASTE...**

- Organic chemical residues from manufacturing process
- Heavy metals
- Returned pharmaceuticals



- Expired pharmaceuticals
- Half used pharmaceuticals
- Test animal remains
- Pharmaceutical gases
- Biological products including materials extracted from biological materials such as vaccines, serums, and various plasma derivatives

#### 11.4 COMMON HOSPITAL WASTE...

- Paper, plastic, glass
- Infectious waste
- Anatomic wastes (body parts and tissues)
- Sharps waste (syringes, needles, and blades)
- Chemical waste
- Expired drugs,
- Vaccines and sera
- Radioactive materials
- Non-medical waste



#### 11.5 PHARMACEUTICAL AND HOSPITAL WASTE MANAGEMENT:

There are different method adopted by pharmaceutical industries and hospitals for managing the waste. Improper management of health care waste can have both direct and indirect health consequences for health personnel, community members and the environment. The proper management of health-care waste depends on good administration and organization along with adequate legislation, financing and active participation of trained and informed staff.

#### 11.6 GENERAL GUIDELINE FOR PROPER DISPOSAL OF WASTE:

- Place all pharmaceutical waste in rigid leak-proof containers
- Store liquid wastes separately in appropriate individual leak-proof containers to prevent mixing

- Containers should be clearly labeled by the manufacturer to identify that they are suitable for and contain pharmaceutical waste
- All pharmaceutical and hospital waste must be managed and disposed off according to the law and regulation
- A clear policy for waste management should be prepared and made available for proper implementation of waste management system
- Roles and responsibilities of different team members should be clarified
- Special clothing, gloves, masks and eye protection should be identified and provided to the healthcare workers responsible for waste transportation and disposal

### 11.7 MINIMUM ELEMENTS OF A COMPLETE WASTE MANAGEMENT PROGRAM:

- Written plan
- Clear responsibilities
- Written, internal rules
- Staff training
- Protective clothing
- Good hygiene practices
- Vaccinated workers
- Designated storage locations
- Waste minimization
- Waste segregation
- Waste Treatment
- Final disposal site
- Periodic reviews



#### 11.7.1 Written Plan:

A written waste management plan describes all the practices for handling, storing, treating, and disposing of hazardous and non-hazardous waste, as well as types of worker training required.

**11.7.2 Clear Responsibilities:**

Make responsibilities clear so that workers feel accountable for how well tasks are completed and no step in the process is overlooked.

**11.7.3 Written Internal Rules:**

Written internal rules used for providing guidelines during the process of generation, handling, storage, treatment, and disposal of waste.

**11.7.4 Staff Training:**

Training is necessary to ensure that staff is aware of all hazards they might encounter and that they are practicing good hygiene, safe sharps handling, proper use of protective clothing, proper packaging and labeling of waste, and safe storage of waste.

**11.7.5 Protective Clothing:**

Workers need specific types of clothing, such as surgical masks and gloves, aprons, and boots, to protect them when moving and treating various types of collected infectious waste.

**11.7.6 Good Hygiene Practices:**

There should be a good hygiene practices. Workers must wash their hands and faces regularly with soap and warm water. They get sick more often when they do not observe good hygiene practices.

**11.7.7 Vaccinated Worker:**

Workers should be vaccinated against infections.

**11.7.8 Designated Storage Locations:**

Storage locations should be proper labeled, and covered. They should not be near patients or food.



**11.7.9 Waste Minimization:**

The less waste generated, the less has to be managed. Unnecessary disposal of valuable chemicals and pharmaceuticals can be avoided through good inventory control practices.

**11.7.10 Waste Segregation:**

A waste segregation system reduces the volume of waste and enables different kinds of materials to be handled appropriately.

**11.7.11 Waste Treatment:**

Infectious agents make the waste dangerous. So proper waste treatment should be practiced. The most important function of treatment is disinfections.

**11.7.12 Final Disposal Site:**

There should be a proper site for disposing the waste.

**11.7.13 Periodic Reviews:**

A periodic review is necessary for maintaining good waste management practices and continuous improvement. It ensures the minimum risk, damage and disease.

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