Program	**:**	B. Pharmacy
Name of Unit	**:**	Hospital Pharmacy, Adverse drug reaction, Community Pharmacy
Subject /Course name	**:**	Pharmacy Practice
Subject/Course ID	**:**	BP 703T
Class: B.Pharm. Semester	**:**	VII
Module	**:**	I
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Learning Outcome of Unit

LO	Learning Outcome (LO)	Course Outcome Code
LO1	Students understand the various services provided by hospital organization.	BP703.1
LO2	Students learn about Predictable and non-predictable type adverse drug reactions.	BP703.6
LO3	Students learn about phenomenon of drug interaction, Pharmacokinetic and pharmacodynamics drug interaction.	BP703.3
LO4	Students understand the roles of pharmacist in community pharmacy.	BP703.2

MODULE CONTENT TABLE

No.	Topic
1	Hospital and its organization:- Defination, classification, organization structure of a hospital, medical staff involved in the hospital and their functions.
2	Hospital pharmacy and its organization:- Defination, functions, organization ,location, layout and staff requirements and responsibilities and functions of hospital pharmacist.
3	Adverse drug reaction:- Classifications-Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determines toxicity, toxicity following sudden withdrawal of drugs.
4	Drug interaction:- Beneficial interactions, adverse interactions, pharmacokinetics drug interaction, methods for detecting drug interactions, spontaneous case reports and records linkage studies, ADR reporting and management.
5	Community pharmacy:- Organization and structure of retail and wholesale drug store, types, design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

1. HOSPITAL AND ITS ORGANIZATION

Hospitals are the institution providing medical and surgical treatment and nursing care for all ill or injured people.

Acc. To W.H.O.“ The Hospital is an integral part of social and medical organization, the function of which is to provide for the population , complete health care, both curative and preventive and whose outpatient services reach out to the family and its home environment; the hospital is also center for the training of health workers and for social research.

Functions of a hospital

1. To raise the quality of law and general standards of medical practice.
2. To estimate the needs for facilities, supplies and equipment and then utilize these facilities for evaluation, control and maintenance.
3. It provides a common link between the general public and policy makers.
4. It lowers the incidences of disease through early detection and treatment.
5. It stimulates the growth of medical science whereby doctors and nurses receive their training in large teaching hospitals.
6. To develop and to maintain an effective system of clinical and administrative records and reports.
7. To participate in the financial plan for the operation of hospital.
8. To provide facility for continuing education for all the persons.
9. To participate in and put into practice, the safety programmes of the hospital.
10. To initiate, utilize and participate in research projects designed for improvement of patient care and other hospital services.

Classification of hospitals

A. On the basis of care

a) Primary hospital:- Primary care is the day to day healthcare given by a healthcare provider. Typically this provider acts as the first contact and principal point of continuing care for patients within a healthcare system. It is generally regarded as the ‘gateway’ to receiving more specialist care.

e.g.Upazila health complex.

Primary health care also denotes the first level of contact between individuals and families with the health system. Primary hospital include care for mother and child which include family planning ,immunization, treatment of common disease, health education etc.

b) Secondary hospital:-Secondary health care refers to a second tier of health system, in which patients from higher hospitals for treatment.
District hospitals and community health centre at block level.

c) Tertiary hospitals:- Tertiary healthcare refers to a third level of health system, in which specialized consultative care is provided usually on referral from primary and secondary medical care.
Specialized ICU, advanced diagnostic support services and specialized medicalpersonnel.

B. On clinical and non-clinical basis

a) Clinical basis

- Medicine – Paediatrics, psychiatric and nervous diseases, T.B., general medicine
- Surgery – Orthopaedic, gynecology, ENT
- Maternity – Short term, long term

b) Non clinical basis

✓ Governmental

1. Army hospital
2. Navy hospital
3. City hospital
4. Civil hospital
5. Big hospital
6. AIIMS/PGI etc.

✓ Non- governmental

1. Private hospital for profit
2. Church hospital
3. Missionary hospital
4. Non-profit hospital
5. Community hospital
6. Charitable hospital

C. On the basis of size

a) Large hospital have 1000 and above beds.

b) Medium hospital have beds between 500-1000.

c) Small hospital have beds between100-500.

d) Very small hospital have beds less than 100.

D. On the basis of cost

a) Elite hospitals:- These are symbols of high technology and advances in medical sciences. They have deluxe rooms. The room rates vary from rs. 500 to 1200 per day.

b) Budget hospital:- These hospital are meant for moderate budget and low budget persons.

e.g. civil and charitable hospital

E. On the basis of system of medicine

a) Allopathic hospitals

b) Ayurvedic hospitals

c) Homeopathic hospitals

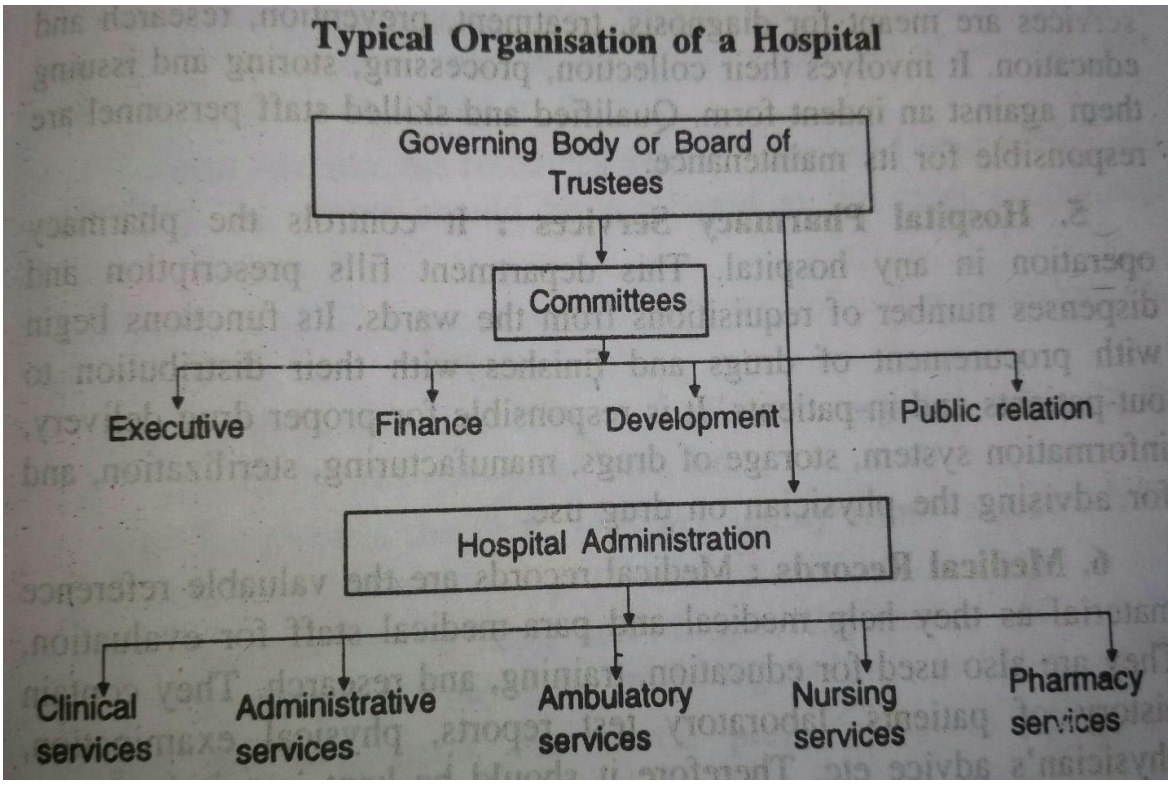
d) Unani hospitals

e) Nature cure

f) Veterinary

ORGANISATION OF HOSPITALS

Organisation is a dynamic process in which various managerial activities bring people together and binds them together for the achievement of common objective or goals. The most important body of any hospital is the governing body or board of directors or board of trustees. It comprises of various eminent personalities in the field of medical education, research and administration. It may also include politicians. The governing body is responsible for framing



of all major policies, plans and programmes of any hospital. Various committees are appointed by governing body. It appoints a hospital administrator to get the various functions.
Detailed review of these services performed by any organization is given as under:

- ✓ Nursing services- This department is large and functions for all 24 hours. Nurses are assigned for specified no. of beds. They are trained for prenatal care, observation, comfort of patient during labour.
- ✓ Out patient services- It include comfort for out-patients as they come for their majoror minor illness.
- ✓ Radiological services- These are performed under the direction of competent radiologist. It includes utilization of various equipments like sonography, X-

rays, E.C.G, C.T. Scan etc.

- ✓ Central supply services- All medical and surgical supply services meant for diagnosis, prevention, research and education. It involves their collection, processing, storing and issuing them against an indent form.
- ✓ Hospital pharmacy services – This department fills prescription and dispenses no. of requisition from the wards. It is responsible for proper drug delivery, information system, storage of drugs, manufacturing, sterilization, for advising the physician on drug use.
- ✓ Medical records – Medical records are valuable reference material as they help medical and para-medical staff for evaluation. They contain history of patients, lab test reports, physical examination, physician's advice etc.
- ✓ Stores – Stores generally store, receive and issue the material against requisition forms of various department and wards. They always maintain a buffer stock of certain articles.

Medical staff involved in hospital

The health care team consists of a group of people who coordinate their particular skills in order to assist a patient. The personnel, who comprise a particular team will depend upon needs a patient.

- ❖ Physicians
- ❖ Nurses
- ❖ Social workers
- ❖ Trained dais
- ❖ Village health guides
- ❖ Health assistants
- ❖ Auxiliary personnel

Physician: - In hospital, the physician is responsible for the medical diagnosis and for determining the therapy required by a person who is ill or injured. It is a person who is legally authorized to practice medicine in particular jurisdiction.

Nurse:- A number of nursing personnel may be involved in the health team and may have their own nursing team. Nursing team comprised of personnel who provide nursing services to a patient. "Head nurse" is responsible for delegation of duties to members of her team and care given to the patients.

The dietitian:- When dietary and nutritional services are required a dietitian may also the member of the health team. Dietitians supervise the preparation of meals according to doctor's prescription. The nutritionist in a community setting recommends health diets for people and is frequently involves in board advisory services in regard to purchase and preparation of food.

The Physiotherapist:- it provides assistance to a patient who has problem related to

musculoskeletal system. Their functions include; assessing mobility and strength, providing therapeutic measures and teaching patients news skills and measures.

The social worker:-The patient and his family member are assisted by social worker with such problems such as finances, rest home accommodation, counselling or marital problems, and adoption of children.

The occupational therapist assists patients with some impairment of function to gain skills as they are related to activities of daily living (ADL) and help with a skill that is therapeutic.

The paramedical technologist includes laboratory technologies, radio-logic technologists. The laboratory technologists examine and study specimens such as urine, faeces, blood and discharges from wound.

The pharmacist prepares and dispenses pharmaceuticals in hospital and community settings. The role of pharmacist in monitoring and evaluating the actions of medications on patients is becoming prominent.

The inhalation therapist or respiratory technologist is skilled in therapeutic measures used in care of patients with respiratory problems. These therapist are knowledgeable about oxygen therapy devices, intermittent positive pressure breathing respirators, artificial mechanical ventilators, accessory devices used for inhalation.

The clinical psychologist constitutes an important member in healthcare team.

2. HOSPITAL PHARMACY

Hospital pharmacy is one of the most important department among several departments of a hospital .Hospital pharmacy may be defined as that department of the hospital which deals with procurement ,storage ,compounding, dispensing, manufacturing, testing, packaging and distribution of drugs. It is also concerned with education and research in pharmaceutical services. A hospital pharmacy is controlled by a professionally qualified pharmacist.

Functions:-Pharmacy is recognized as an essential hospital service in all the major hospitals .It has been realized that only trained pharmaceutical personals are capable of purchasing, storing, handling, pricing and dispensing of medications. It is the pharmacist who is an expert to provide all information regarding drugs to the health professionals and also to the public .Therefore he acts as a link between the physician and the patient.

1)Providing specifications for the purchase of drugs, chemicals and biologicals etc.
2)Proper storing of drugs.
3) Manufacturing and distribution of medicament such as transfusion fluids, parentral products, tablets, capsules, ointment and stock mixtures.

4)Dispensing and sterilizing parentral preparations which are manufactured in hospital.

5)Dispensing of drugs as per the prescription of medical staff of the hospital.

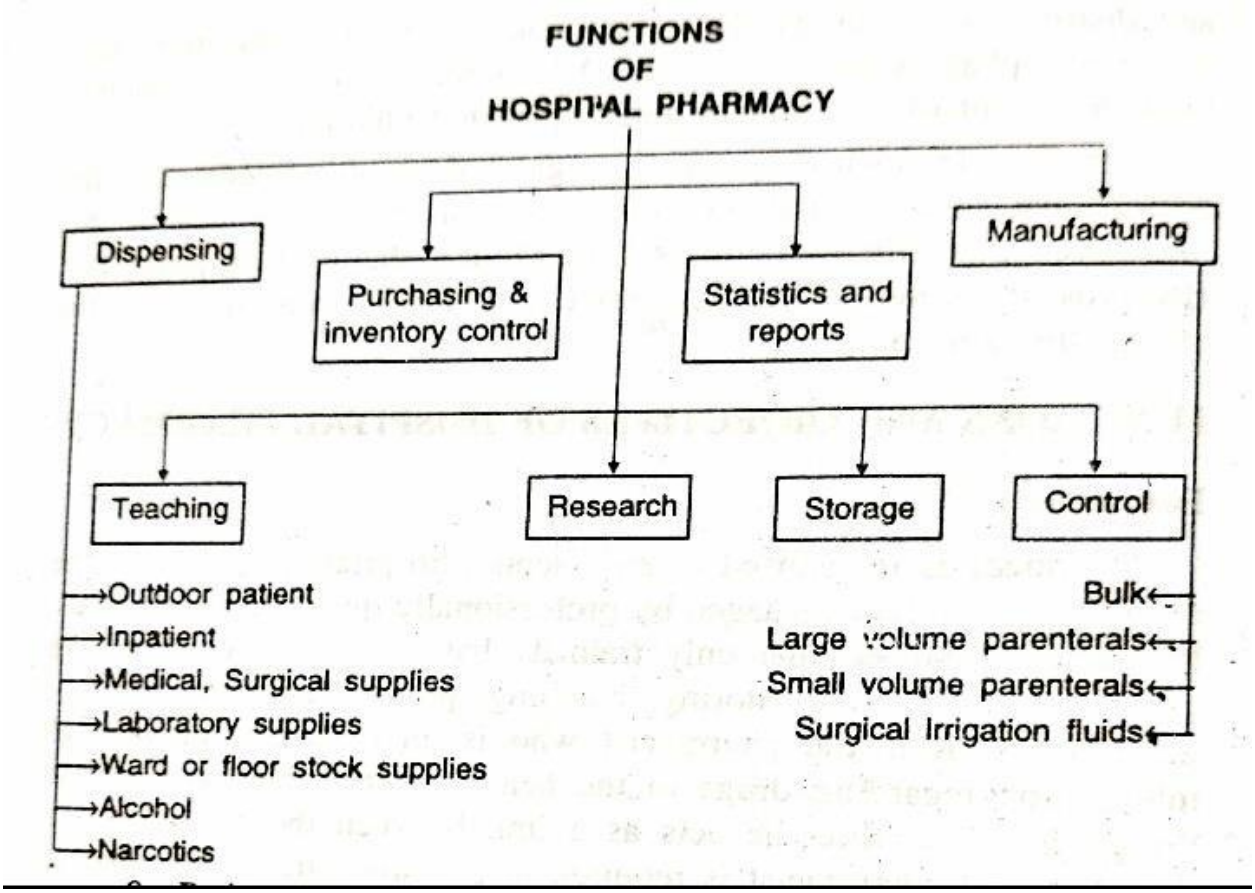
6)Filling and labelling of all containers from which medicines are to be administered.

7)Management of stores which includes purchase of drugs, proper storage condition andmaintenance of records.

8) Establishment and maintenanceof 'Drug Information Centre'which will provide informationregarding medications.

9) Patient counselling service while supplying drugs especially from out-patient department.

10) Providing cooperation in teaching and research programmes.



Objectives: - the practice of hospital pharmacy started in India in 1941. The objectives of hospital pharmacy are-

- To ensure the availability of the right medication, at the right time, in the right dose atminimum cost.
- To professionalize the functioning of pharmaceutical services.
- To act as a counselling department for medical staff, nurses and for patient.
- To act as a data bank on drug utilization.

- To participate in research projects.
- To plan, organize and implement pharmacy policy procedures.
- To implement decisions of Pharmacy and therapeutic committee.

- Location and layout:-

The pharmacy should be located in the hospital premises so that patients and staff can easily approach it. In multi-stored building of a hospital, the pharmacy should be located on the ground floor especially the dispensing unit.

Out-patient pharmacy should give a pleasant appearance and must have enough space for seating of patients. Space must be provided for routine manufacturing of stock solution, bulk powders, ointment etc. medical stores of a pharmacy should be adjacent to the pharmacy itself or should be directly connected with pharmacy. Pharmacy receives materials from two sources: Medical stores and manufacturing division of the hospital.

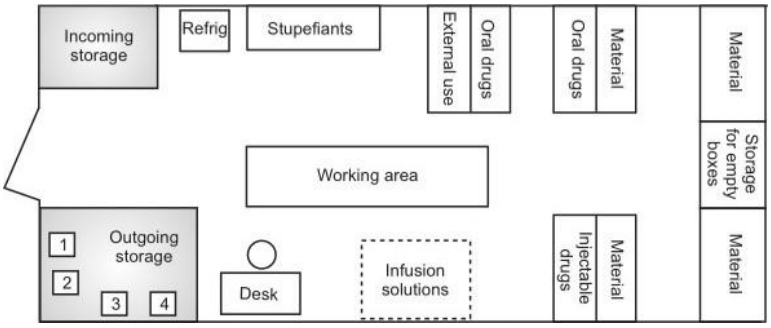


Fig:- A typical layout of hospital pharmacy

Medical stores and manufacturing units issue against requisition from various departments. Pharmacy department exercises quality control of materials

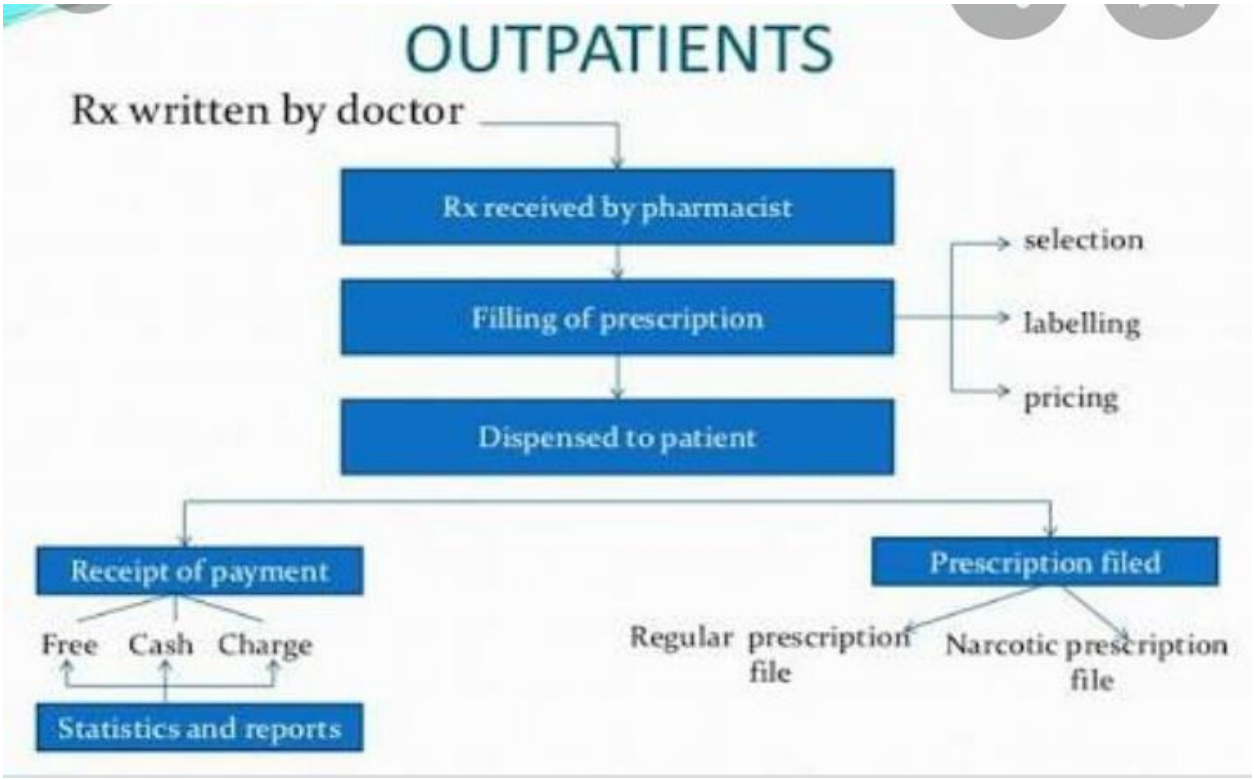


Fig:- General flow chart for outpatients

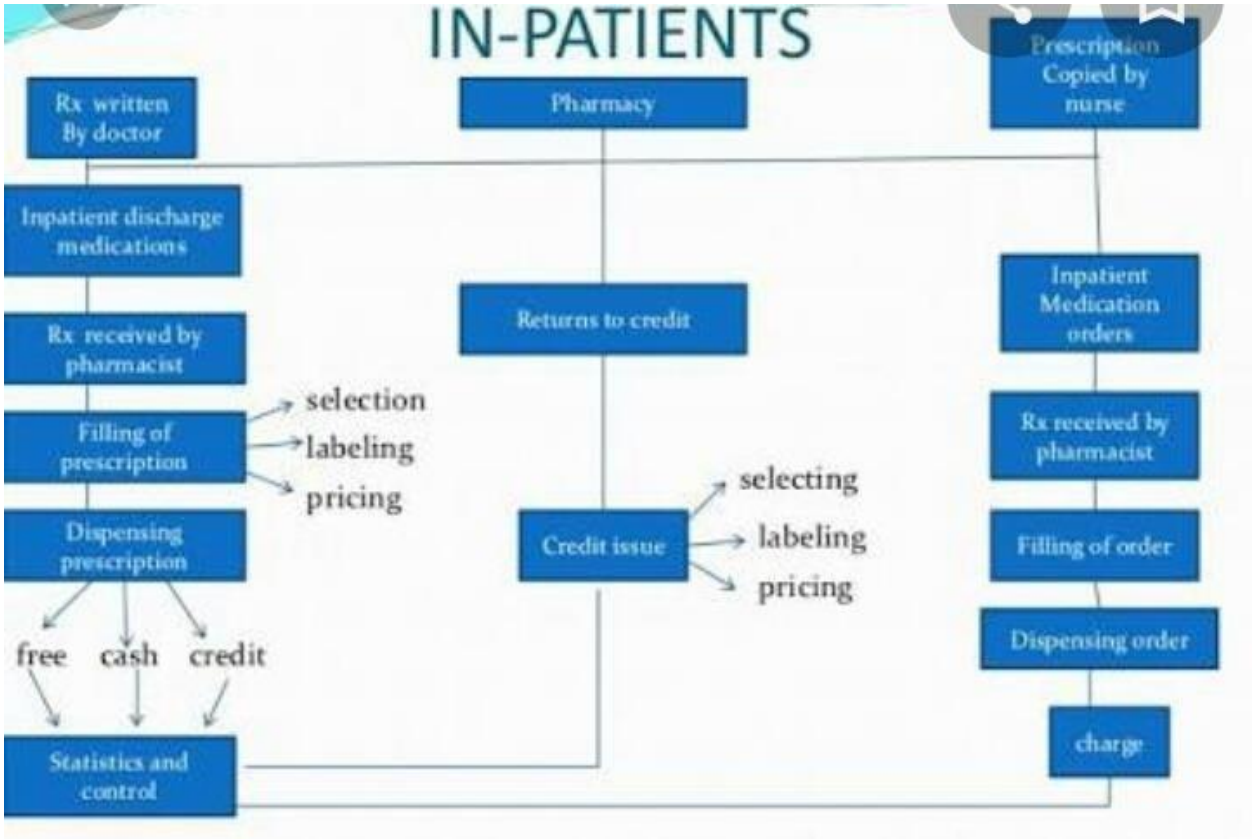


Fig:-General flow chart for Inpatients

3. ADVERSE DRUG REACTION

W.H.O. defines adverse drug reaction as "Any response to a drug which is Noxious, unintended and occurs at doses used in man for propylaxis, diagnosis or therapy."

The negative and undesirable effects of drug therapy are known as adverse drug reaction. These reactions may be caused by the drug itself or one of its metabolites; from an interaction between two or more drugs or between a drug and food; or may be caused by an excipient in the product, such as dye or preservative.

Classification of ADRs Rawlins and Thompson classification:

In this classification, the ADRs are categorized into two classes;

type A and type B reactions

1. **Type-A Reaction (95%)**
   - Type-A reactions are common and predictable with most identified prior to marketing.
   - These are dose related and result directly from the pharmacological action of the drug, but can be due to – drug-drug interactions, – drug-food interactions, – This represent approximately 70 to 80% of all ADRs.

   Examples of Type-A Reaction: – Excessive effects of the pharmaclological action of a drug,
   - Example: haemorrhage with anticoagulants. – Unwanted pharmacological actions of a drug,
   - Example: antimuscarinic effects of tricyclic antidepressants which can result in blurred vision, tachycardia, dry mouth and urinary retention. – Withdrawal reactions, which may occurs with abrupt withdrawal of some drugs after prolonged use,
   - Example: insomnia with hypnotics.
2. **Type-B Reaction (5%)**
   - Type B reactions are unexpected effects which are unrelated to the known pharmacological action of the drug.
   - This type of ADRs is uncommon, cannot be predicted, is not dose-related, and has no relation to the pharmacological action of the drug.
   - In most cases, the mechanism involved in type-B reactions is unknown.

Characteristics of ADRs

Type A Reaction	Type B Reaction
Normal, Augmented response	Abnormal, Bizarre response
Predictable from Pharmacology	Unpredictable from Pharmacology
Dose Related	Not Dose Related
Reasonably Common	Reasonably Uncommon
Rarely Fatal	Often causes serious illness or death

Wills and Brown classification: To overcome the limitations of Rawlins and Thompson classification, adverse reactions are classified into nine categories based on their mechanism:

1.Type A (Augmented) Dose related • Pharmacologically predictable • Improves if medication is withdrawn • Common

2.Type B (Bugs) Non- dose related • Pharmacologically predictable • Involves reaction with microorganism • Improves if medicine withdrawn

3.Type C (Chemical/Chronic) Dose related & time related • They are not pharmacologically predictable, but may be seen based on the knowledge of physicochemical characteristics of the drug. Type C reactions are irritant reaction that is related to drug concentration. eg: contact dermatitis.

4.Type D (Delivery/Delayed) Time related • Type D reactions are independent of the chemical as well as pharmacological properties of the drug. Instead, they occur due to method of administration or nature of the drug formulation. It can be improved if medicine withdrawn or method of delivery changed. eg: infection at the site of injection

5.Type E (Exit/End of use) Withdrawal • The reactions are pharmacologically predictable and begin only when the drug is withdrawn or the dose is reduced. The condition of the patient improves when the drug therapy is reintroduced. eg: withdrawal seizure when anticonvulsants like Phenytoin is withdrawn

6.Type F (Familial/Failure) Failure of therapy • They only occur in genetically predisposed patient. It can be improved if medicine withdrawn. eg: hemolytic anemia with primaquin in G6PD deficient individuals.

7.Type G (Genotoxicity) • Irreversible genetic damage is caused by this Type G adverse reaction. eg: teratogenic agent like Thalidomide causes genetic damage to the developing fetus.

8.Type H (Hypersensitivity) • They are also known as drug allergy and is often immune mediated response.
9.Type U (Unclassified) • This includes those reactions in which the mechanism is unclear. eg: taste disturbances associated with Simvastatin.

Severity of ADR

1. Minor: no need of therapy, antidote or hospitalization
2. Moderate: requires drug change, specific treatment, hospitalization
3. Severe: potentially life threatening, permanent damage, prolonged hospitalization
4. Lethal: directly or indirectly leads to death

ADR Categories

1. Side effects
2. Secondary effects
3. Toxic effects
4. Intolerance
5. Idiosyncrasy
6. Drug allergy
7. Photosensitivity
8. Drug dependence
9. Drug withdrawal reactions
10. Teratogenicity
11. Mutagenicity & carcinogenicity

4. DRUG INTERACTION

It is common for patient and doctor to prescribe more than one drug and this situation of multiple drug therapy may lead to drug interaction.

The varied and complex mechanism involved in drug interaction. They can mostly classify as pharmacokinetic interaction and pharmacodynamic interaction.

In pharmacokinetic interaction, one drug alters the absorption, distribution, metabolism or elimination of the other drugs.

In pharmacodynamic interaction, drugs modify the intended and expected action of other drugs.

Definition: Drug interaction results into quantifiable alteration in response of one drug when administered with another drug, [Interaction including from prescription, nonprescription including complementary medicines drugs, food, alcohol, and smoking of cigarette or diagnostic tests.

Drug interaction results into increased or decreased in the efficacy or toxicity of drug which is very dangerous in some time to the patient. There are large numbers of drug interactions associated with use of anticoagulants, oral hypoglycemic agents, use of cytotoxic drugs, use of digoxin, etc.

Mechanisms of Drug Interactions

For better understanding to these complex interactions it is mechanically divided into the following two parts:

- Pharmacodynamic Interactions: In this interaction, agonist drugs act on the same receptor site results into enhancing the drug action while the antagonistic drug blocks the action of agonist by binding at the same receptor site as of agonist drug.
- Pharmacokinetic Interactions: In this interaction, drugs affect the absorption, distribution, metabolism or elimination of other drugs.

MONITORING SYSTEM TO DETECT REACTIONS AND INTERACTIONS

To obtain information on serious, rare and unknown ADRs at early stage i.e. "Early Warning",

ADRs has been monitored in many countries since beginning of 1960.

Intermittent assessment of ADRs which are reported in a hospital helps in differentiate

the pattern of ADRs and thereby assist in designing steps to improve the safety of drug

use in hospital. These ADRs data contributes to national and international database of

ADRs which may further contributes in decision making on drug safety as well as to

contribute in design strategy for patient education. Following are steps used in monitoring the adverse drug reaction:

I. Identifying ADR:

Generally, the ADRs are monitoring in the pre-marketing and post marketing surveillance studies. There are some disadvantages of pre-marketing studies that they are deficient in generating sufficient knowledge. The data are generated from the animal studies and few numbers of human volunteers and are directly extrapolate these data into human risk. In premarketing study, the clinical trial cannot be done on rare group like; children, elderly and pregnant women. The data generated in pre-marketing study cannot give the information for long term adverse effects.

In post-marketing surveillance ADRs can be monitor by different methods they are as follows:

I. Unreliable Reporting: Mostly, the very first ADR come through unreliable report from the individual doctor when the patient has noticed peculiar effects. Such type of unreliable effect needs to be verified by further studies. Sometimes theses effects fail to confirm in further studies.

2. Intensive Monitoring Studies: These studies provide well organized and thorough compilation of data from well-defined groups of patients. The observation was done by particularly trained healthcare experts who dedicate his service toward recording of all the drugs administered and all the events observed.

3. Spontaneous Reporting System: For monitoring the safety of marketed product spontaneous reporting system is the primary method of monitoring. In this system, healthcare professional is encouraged to report any or all kind of reactions that he

considers due to use of medicine. Typically, awareness is focused on new drugs and serious ADRs observed.

4. Cohort Studies (Prospective Studies): In these studies, recognized the patients during drug administration and record the any event observed. The major weakness of this method is very small numbers of patients are involved as well as lacking of suitable control group to distinguish the incidence of any adverse events. Results of such kind of study are difficult to interpret and justify for newly marketed product.

5. Case Control Studies (Retrospective Studies): In these studies, patient those shows adverse events are screened to see the events due to drug taken or not. The commonness of drug taken by group of patient compared with reference population who do not have symptoms. Thus, case control studies consider suitable for determination of ADRs while it is not suitable for monitoring of ADRs of completely new drug.

6. Case Cohort Studies: In these studies, patient those shows ADRs due to drug administration are screened and compared for similarity of symptoms who received similar drugs in prospective cohort studies.

7. Record Linkage: In this system, all patient's data related to general practice record of illness and prescription record are linked together. Thus, it is easy to match the ADRs of prescribed drugs. It is also called prescription event monitoring system. In this system all prescription issued by specific physician for particular drug are obtained. Thus, it is easy for the physician to scrutinize similar ADRs which are reported by the patient after taking similar medicine. This scheme is less expensive and time consuming than other monitoring methods.

8. Meta Analysis: Meta analysis need to perform when there is variation in study results. In this study, quantitative investigation of two or more independent studies need to performed to identify ADRs and assessing the drug safety.

REPORTING OF ADVERSE DRUG REACTION

Healthcare professional should consent to in mind when reporting an ADR that the reports are only indicated for suspected connections to administered drug which caused a particular adverse event. Reporting an ADR does not involve a causal relationship between the drug and the adverse reaction. However, in a suspicious case it is better to report than not to report the event.

What to Report?

Any unwanted adverse event believed to be associated with use of drug, biological (including

blood products), cosmetics or medical devices and herbal drugs, should be reported.

The report should include:

- All suspected adverse drug reactions apart from product is used according to product information or not.
- A serious reaction, whether expected or not expected.
- Unpredicted reaction, regardless of their nature or severity.
- All suspected ADRs associated with drug-drug, drug-food interactions.
- ADRs occurring from overdose of drug or error of medication.
- An observed increase in frequency of a given reaction.
- ADRs in special field of interest such as drug use in pregnancy and lactation.
- Remarkable lack of effectiveness because of defect in pharmaceutical product.

What information is required for an ADR case report?

The minimal standard information to be provided for proper estimation of the ADR case report are:

1. Patient information
2. Description of adverse reactions (include laboratory results if available)
3. Information related to the suspected drug(s)
4. Information on management of the adverse reactions
5. Information about the reporter

PREVENTION AND MANAGEMENT OF ADVERSE DRUG REACTION AND DRUG INTERACTION

Following preventive measures can be consider avoiding or minimized the occurrence of adverse reactions or drug interactions in the patients:

- Avoid incorrect use of drugs in the circumstance of clinical condition.
- Use the drug at right dose, by correct route and at correct frequency
- The particular attention is essential regarding drug dose and response in neonates and geriatric patients and also about renal, hepatic and cardiac disease patient.
- Drug should be used only when there is a need and clear indication for use and there is no other alternative to use.
- The need of continuing of treatment should be regularly reviewed and stop the drug which are not necessary.
- Before use of any drug first collect the previous medication history, specially consider the untoward incidents with the use of particular drug.
- Collect the information of allergic history.
- Drug alert cart used for those drugs which has incidence of adverse reactions thus such cart can reduce the number of ADRs.
- Rule out drug interactions.
- Be aware of interactions with certain foods, alcohol and even with household chemicals.
- The role of pharmacist to prevent the ADRs by daily visit to the nursing units to discuss possible and reported ADR also by patient interviews and study all medications prescribed to treat adverse drug reaction.
- Adopt right technique e.g. slow I.V. injection of aminophylline.
- Appropriate monitoring is required. For example: Prothrombin Time (PT) with warfarin.

COMMUNITY PHARMACY

Community Pharmacy comprises all the setup that owned privately and has the responsibilities to serve the society to fulfil the need of drug and pharmaceutical services. The leading responsibilities of a community pharmacy are compounding, advising and distributing of drugs to the patients. The community pharmacy provides the services with very care, accuracy, and legality along with the appropriate procurement, storage, distribution and documentation of medicines. The community pharmacist should possess relevant educational qualification, skills and proficiency to provide the professional service to the community.

A community pharmacist should have following qualities:

(i) Sound experience of pharmaceutical care and health promotion.

(ii) Good communication skills with patients and other healthcare providers.

(iii) Continue to maintain a high grade of standard in development of products, services, and communication.

(iv) Record to maintain documentation of dispensing of all orders.

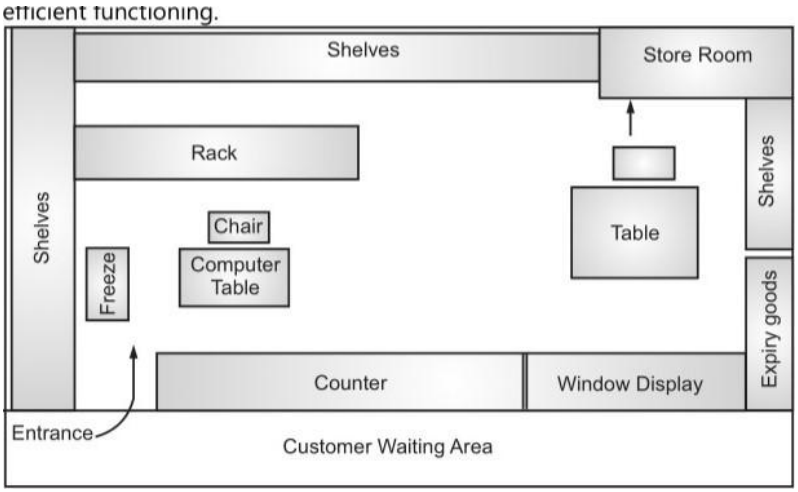
Community Pharmacy is defined largely to comprise all privately owned establishments involved in the performance of the functions in varying degree to serve the societies need for pharmaceutical products and related services. Community pharmacy is the branch of pharmacy responsible to serves the different kinds of patient care and dispensing of medicines and counsels the patient on the drug safety and rational use of drugs.

Ideal drug store should possess following plan to execute properly:

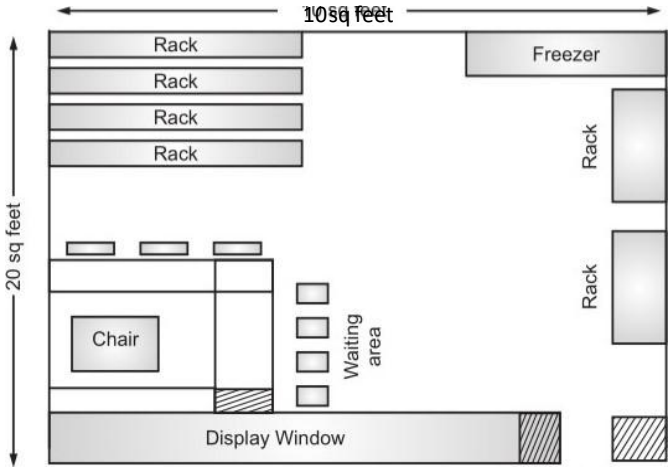
1. Supervision and controlling of material handling and transportation.
2. Proper designing of suitable work locations.
3. Allocation of suitable locations as a production centers and service centers.
4. Minimized the movement of worker at production centre and wherever it required.
5. Minimized the waiting time of the semi furnished product.
6. Improvement in the methodology of work so there can reduce the production cycle in terms of times.
7. Flexibility to change the design of product for their future expansions.

A good layout permits the supply of the materials through the plant at the desired speed with the lower cost. Following are the general layouts for the retail and wholesale pharmacy store for efficient functioning.

efficient functioning.



Layout of Retail Pharmacy Store



Layout of Wholesale Pharmacy Store

TYPES OF LAYOUT

There are mainly following types of layouts:

1. Process Layout:

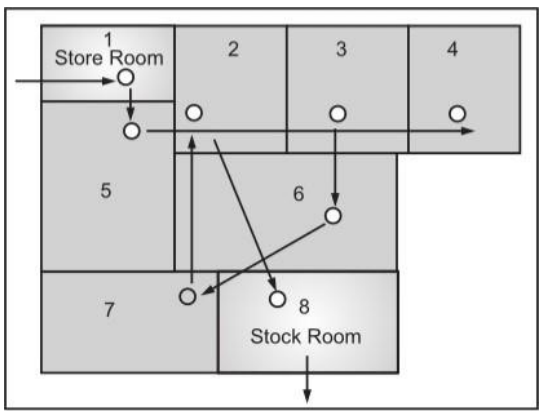
It is also known as functional layout and is categorized by keeping similar machines/operational tool at one location. The arrangement is like a separate department, in which, particular class of machine or operational tool doing particular type of work or process e.g. cutting machines may be placed under cutting department.

Advantages

(i) Better utilization of resources.
(ii) Greater flexibility.
(iii) Better supervision which ultimately leads to better production.
(iv) While doing such arrangements, there may require a smaller number of machines or other resources thereby results into reduced capital.

Disadvantages:

• In pharmaceutical and chemical industries, the functional layout type may not be possible due to sequential performance/operation of many of the unit/sector.

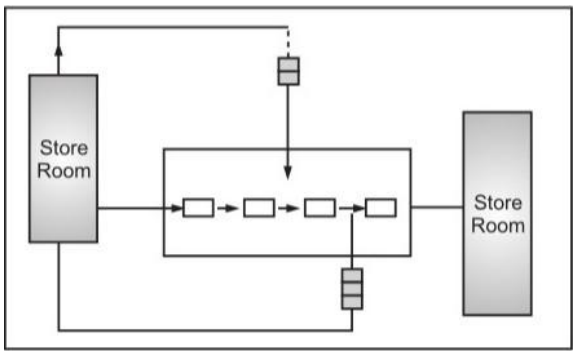


Process Layout

2. Product Layout:

This type of layout also called as straight-line layout and is required to standardize in beginning according to manufacturing process of particular product. Using such product layout design, the product can be manufactured in large quantity by repetitive operation. Advantages:

(i) Less space requirements for the same volume of production.
(ii) Smooth and continuous work flow.
(iii) Processing of work is quick and smooth.
(iv) Floor space can be properly utilized.
(v) Less in-process inventory.
(vi) Cost of material handling can be reduced by using conveyors.
(vii) Manufacturing time is reduced and manufacturing cycle can be speeded up. This type of layout is more suitable for the Pharmaceutical Industries.



Product Layout

3. Combination layout

In this layout, they use a combination of both functional and product layout for more advantages.

A combination of process and product layout combines the advantages of both types of layout. The layout should be well-organized by keeping handling of material at a minimum level. While they requires suitable layout to keep the cost of product minimum.

LEGAL REQUIREMENTS FOR ESTABLISHMENT AND MAINTENANCE OF DRUG STORE

Requirements for the Establishments of Drug Store

- General License:

Granted to person who have premise for business and who engage the services of qualified person to supervise the sale of drugs.

The license for the retail sale of drugs other than the ones mentioned in the schedule C, Cl and X issued in form 20. For drugs specified in Schedule C and Cl in form 21. Schedule X drugs in form 20F.

- Restricted License:

The licenses for restricted sale of drugs other than those specified in Schedule C, Cl and X are issued in the form 20A.Those specified in Schedule C and Cl but not in schedule X are issued in form 21A.

Requirements for the Maintenance of Records of Drug Stores

1. Legal Records:

According the Federal State Law, up to date and proper records should be maintained according to Drugs and Cosmetics act 1940, Rules 1945 and Poison act 1919 for the maintenance of records of distribution of poisonous substances.

2.Patient Records:

Patient drug history , Information on all kinds of and amounts of drugs taken by average patients.

3. Financial Records:

Financial records need to maintain for the following purposes:

- For evaluation of past records, past operations, forecasting needs and controlling the needs.
- Analyzing revenues and expenses.
- Measuring return on investment.
- Help ensure profitable operations.

Dispensing of proprietary products

Dispensing is a main part of pharmacy practice in which the distributor/pharmacist takes the required order of medicine from physician on the prescription and accordingly supplies the medicines for the treatment of the patients. Following are the general patterns follow for the dispensing of the proprietary products.

Layout of Dispensing Procedure:

Receiving the order of proprietary drug like Amlodipine. Check whether this order received correctly.

- Keep the received order at side and check for expiry date and storage conditions.
  Keep the received order in proper dispensary shelf or drawer. Location of shelf for the received order should not be confused with other available stock.
- Receive the order (Amlodipine) of prescription and locate the medicine for dispensing.
- During locating of medicine, dispenser should check the medicine for correctness because there may similarly sounding medicine next to it e.g. amitriptyline.
- Identify and pick the correct medicine. Check the medicine strength and quantity as per the order received from physician.
- Label and dispense the medicine.
- Before dispensing of medicine, check the label; and instruction given on the label and same to be instruct to patients.
- Hand out the medicine to patient. Check the right patient to whom the right medicine is hand out.

QUESTION BANK

A. QUESTIONS 2 MARKS

1. Enlist the functions of hospitals.
2. Give the various clinical services in hospital.
3. Give the role of satellite pharmacy.
4. Define adverse drug reaction.
5. Give the characteristics of idiosyncracy.
6. Define drug interaction.
7. Define coding.
8. Give the objective of layout of design.
9. Draw layout of wholesale drug store.
10. Enlist types of drug stores.

B. QUESTIONS 5 MARKS

1. Define hospitals and classify it with examples.
2. Write a short note on location and layout of hospital pharmacy.
3. Describe classification of ADR.
4. Describe mechanism of pharmacokinetics interaction.
5. What is the role of community pharmacist?

C. QUESTIONS 10 MARKS

1. What are the legal requirements for the establishment of drug store?
2. Give the objective of layout design and plan of an ideal retail and wholesale drug store.
3. Explain methods of detecting adverse drug effects.
4. Explain goal and history of hospital pharmacy.
5. Describe the functions and objective of hospital pharmacy services.