Chapter-4

Drug distribution

- **Drug distribution (in- patients and out - patients) – Definition, advantages and disadvantages of individual prescription order method, Floor Stock Method, Unit Dose Drug Distribution Method, Drug Basket Method.**
- **Distribution of drugs to ICCU/ICU/NICU/Emergency wards.**
- **Automated drug dispensing systems and devices**
- **Distribution of Narcotic and Psychotropic substances and their storage**

Drug distribution:

Drug distribution is defined as, "Physical transfer of drugs from storage area in the hospital to the patient's bedside". This involves two types of drug distribution.

They are: -

1. In-patient distribution
2. Out-patient distribution

Inpatient 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.

This can be done through a number of different methods, including:

1. Unit-dose dispensing: This involves providing each patient with individually packaged doses of medication, which are labeled with the patient's name and the medication's name and dosage. This helps to prevent medication errors and ensures that patients receive the correct medication at the correct time.

2. Ward stock: This involves storing medication on the patient's ward, rather than in a central pharmacy. Nurses or other healthcare professionals can then access the medication as needed.

3. Automated dispensing cabinets: These are computerized cabinets that store medication and dispense it automatically when authorized healthcare professionals enter their credentials.

Out-patient drug distribution:

Out-patient drug distribution involves providing medication to patients who are not currently admitted to a healthcare facility.

This can include patients who are receiving treatment at a clinic, doctor's office, or other outpatient facility, as well as patients who are managing their own medication at home. Out-patient drug distribution methods can include:

1. Retail pharmacies: Patients can obtain their medication from a retail pharmacy, either in-person or through mail order.
2. Specialty pharmacies: These pharmacies specialize in providing medication for patients with complex medical conditions, such as cancer or HIV.
3. Mail-order pharmacies: Patients can order their medication online or over the phone and have it delivered to their home.

Advantages of individual prescription order method

The individual prescription order method is a drug distribution method that involves providing each patient with individually packaged doses of medication, which are labeled with the patient's name and the medication's name and dosage. Here are some advantages of this method:

1. Reduces medication errors: With individual prescription order method, the chances of medication errors are significantly reduced since the medication is packaged and labeled specifically for the individual patient. This helps to ensure that patients receive the correct medication at the correct time, which can improve patient safety and outcomes.
2. Convenient for patients: Individual prescription order method is convenient for patients as they do not have to worry about remembering to take multiple pills at different times throughout the day. The medication is packaged in a way that is easy to take and can be taken on-the-go.
3. Helps with medication adherence: This method can improve medication adherence as patients are more likely to take their medication as prescribed when it is packaged and labeled specifically for them. This can help to improve health outcomes and reduce hospitalizations and readmissions.

4. Reduces waste: With individual prescription order method, there is less medication waste since the medication is dispensed in the exact amount needed for each patient. This can help to reduce the overall cost of medication and minimize the impact on the environment.

Disadvantages of individual prescription order method

1. Cost: This method can be more expensive than other methods of drug distribution, such as ward stock or unit-dose dispensing. The packaging and labeling process for each individual dose can be time-consuming and costly.
2. Time-consuming: The process of packaging and labeling each individual dose can be time-consuming for healthcare professionals. This can take away from other important tasks, such as patient care and medication management.
3. Limited flexibility: Individual prescription order method may not be suitable for all medications or patient populations. Some medications, such as those that require refrigeration, may not be suitable for this method. Additionally, patients who require frequent dosage adjustments may find this method limiting.
4. Storage requirements: With individual prescription order method, there is a need for additional storage space to accommodate the packaged medication. This can be a challenge in healthcare facilities where space is at a premium.
5. Environmental impact: The packaging and labeling materials used in individual prescription order method can have an impact on the environment. This method may generate more waste than other methods of drug distribution.

Floor Stock Method:

- The floor stock method is a method of inventory management that involves keeping a certain quantity of inventory items on hand at all times to meet customer demand. This method is commonly used in retail stores, particularly those that sell fast-moving consumer goods.
- Under the floor stock method, the retailer keeps a certain quantity of each product on the store shelves or sales floor. When a customer purchases an item, the retailer notes the sale and removes the item from inventory.
- As inventory levels approach a predetermined minimum threshold, the retailer orders more of the product to replenish the floor stock.

Unit Dose Drug Distribution Method:

Unit dose drug distribution is a method of dispensing medications in individual, pre-measured doses, typically packaged in single-use containers, such as blister packs or pouches. This system aims to ensure the safe and accurate delivery of medication to patients and reduce the risk of medication errors.

In a unit dose system, medications are prepared by a pharmacist or pharmacy technician and packaged in a way that each dose is clearly labeled with the patient's name, medication name, dosage strength, and administration instructions. This system can be used in hospitals, long-term care facilities, and outpatient settings.

Some advantages of the unit dose drug distribution method include:

- Accuracy: Each dose is individually measured and labeled, reducing the risk of medication errors, including wrong doses, wrong medications, and incorrect administration routes.
- Convenience: The system can be designed to allow for easy administration of medications, particularly in busy settings where time is of the essence.
- Cost-effectiveness: By reducing medication errors and minimizing waste, the system can result in cost savings for both patients and healthcare organizations.
- Improved patient safety: The unit dose system can help to reduce the risk of adverse drug events, which can be particularly dangerous for vulnerable populations, such as the elderly or those with complex medical conditions.

Disadvantage:

- Increased packaging waste: The use of individual packaging for each dose can result in more packaging waste than other drug distribution methods, which can be a concern for environmental sustainability.
- Equipment and personnel requirements: Preparing and dispensing medications using the unit dose system requires specialized equipment and trained personnel, which can increase costs and staffing requirements for healthcare organizations.
- Limited flexibility: The unit dose system may not be suitable for all medications, particularly those that require specialized handling or storage conditions, which can limit its flexibility in some settings.
- Potential for medication errors: Although the unit dose system aims to reduce the risk of medication errors, there is still the potential for mistakes to occur during the preparation or administration of medications, particularly if proper protocols and quality control measures are not in place.

Drug Basket Method:

- The drug basket method is a type of clinical trial design in which a group of patients receives a combination of different drugs, also known as a "drug basket," for the treatment of a specific disease.
- **The goal of this method is to evaluate the safety and effectiveness of the combination of drugs in treating the disease, as well as to identify any potential drug interactions or side effects.**
- In this method, patients are selected based on their specific disease and are given a combination of drugs that are believed to have potential therapeutic benefits. The drugs in the basket may be chosen based on their known or hypothesized mechanisms of action, or they may be selected based on their effectiveness in treating similar diseases.
- The drug basket method is typically used in the early stages of clinical trials, when little is known about the efficacy of the combination of drugs being tested. The results of these trials can be used to guide the development of more targeted therapies and to inform future clinical trials.

Advantage:

1. Efficiency: The drug basket method allows for the simultaneous testing of multiple drugs in combination, which can be more efficient than testing each drug individually. This can speed up the drug development process and reduce costs.
2. Enhanced efficacy: Combination therapies have been shown to be more effective in treating some diseases than single drugs alone. By testing multiple drugs in combination, the drug basket method can potentially identify more effective treatments.
3. Targeting multiple pathways: The drug basket method can test drugs that target different pathways or mechanisms of action, which can be important in diseases with complex or multifactorial causes.
4. Personalization: The drug basket method can be used to identify which drugs or drug combinations work best for specific patient populations, which can help tailor treatments to individual patients.
5. Versatility: The drug basket method can be used to test a wide range of drugs and drug combinations, making it a versatile approach to drug development and clinical research.

Disadvantage:

1. Complexity: The drug basket method can be more complex than testing single drugs, as it requires careful selection and dosing of multiple drugs in combination. This complexity can increase the risk of drug interactions and side effects, as well as make it more difficult to interpret study results.
2. Limited knowledge: The drug basket method is typically used in the early stages of drug development, when little is known about the efficacy and safety of the drugs being tested in combination. This can make it challenging to select the optimal drugs and dosages to include in the basket.

3. Cost: Testing multiple drugs in combination can be more expensive than testing single drugs, as it requires more resources and coordination.
4. Interpretation of results: The interpretation of study results can be more complex with the drug basket method, as it may be difficult to determine which drugs or drug combinations are responsible for any observed effects.
5. Ethics: The use of combination therapies in clinical trials can raise ethical concerns, as patients may be exposed to more potential risks and uncertainties.

Distribution of drugs to ICCU/ICU/NICU/Emergency wards.

Distribution of drugs to ICCU:

ICCU: The intensive Coronary care unit (ICCU) is a unit dedicated to the treatment of heart condition such as coronary heart disease, heart attack, cardiac arrest and heart failure Critical care.

ICU: Intensive care unit, life support are provided in an intensive care Unit for Critically ill Patients.

NICU: Neonatal Intensive care Unit , also known as an intensive care nursery, is a unit specializing in care of ill or Premature new born infants.

The first 28 days of life are referred to as neonatal.

Emergency Ward:

- Also known as an accident and emergency department, emergency room or causality department.
- It is a medical treatment facility specializing emergency medicine, the acute care of patient present without prior appointment, either by own means or ambulance.

Intensive Coronary Care Unit:

- Coronary care unit arose in the 1960s as it became obvious that constant supervision by highly trained personnel , cardiopulmonary resuscitation, and medical intervention may minimize death from cardiovascular disease Complication.
- Patient who are critically unwell are admitted to the ICCU.
- The availability of telemetry or continuous cardiographic monitoring of the heart rhythm, is a key element of coronary treatment.
- Patient with myocardial infarction or unstable angina are commonly admitted to the coronary care Unit.
- Myocardial infarction is the most common morbidity discovered.

- The majority of the medications prescribed were from the WHO'S essential drug list.
- Tablet aspirin is the most commonly prescribed medicine.
- Promethazine, Heparin, hydrocortisone, buprenorphine , streptokinase ,metaprolol, pentazocine and frusemide are among the most commonly utilized injections.
- Antibiotics are used less frequently.

Intensive Care Unit (ICU)

The following is a list of the eight most commonly utilized medications in emergency situations:

- Adenosine
- Amiodarone
- Atropine
- Epinephrine
- Lidocaine
- Procainamide
- Sotalol
- Vasopressin

Neonatal Intensive care Unit (NICU)

- Organ immaturity, congenital disease, or birth related problems are the most common reasons that neonates brought to the NICU.
- They monitor medication dosage and levels.
- They keep the team informed about any potential adverse effects and any addition monitoring that may be required.
- Exposure to potential drug interaction (DDI) is a significant risk related with ADE occurrence in the NICU.
- Medication most commonly administered include: ampicillin, furosemide, dopamine, azithromycin, sildenafil, ibuprofen and fluconazole.

Emergency word:

- Error can occur if a physician prescribes the incorrect medication.
- If the prescription intended by the doctor is not the one communicated to the pharmacy due to an illegally written prescription or a misheard verbal order, if the pharmacy dispenses the incorrect medication or given to the incorrect person.
- One of the ways to overcome this situation was to use emergency trolleys used or missing items on the emergency trolleys as efficient as possible.

- All wards are always fulfilled with emergency medications such as adrenalin, salbutamol, atropine, furosemide, hydrocortisone, insulin, lidocaine, and medical oxygen.

Automated drug dispensing systems and devices:

Automated drug dispensing systems and devices are computerized systems that can accurately dispense medications to patients. These systems can be found in hospitals, pharmacies, and other healthcare facilities.

There are several types of automated drug dispensing systems and devices, including:

1. Robotic dispensing systems: These systems use robots to dispense medications. They can be programmed to dispense a specific dose of a medication, and can handle multiple medications at once.
2. Bar code scanning systems: These systems use bar code technology to ensure that the correct medication is dispensed to the right patient. The bar code on the patient's wristband is scanned, and then the medication is scanned to ensure that it matches the medication prescribed for the patient.
3. Automated medication cabinets: These systems are similar to vending machines and are often used in hospitals. The medications are stored in individual drawers, and the system dispenses the medication based on a prescription order.
4. Pharmacy dispensing systems: These systems are used in pharmacies to fill prescriptions. The system can accurately count and dispense pills, and can also label and package the medications.

Distribution of Narcotic and Psychotropic substances and their storage:

Narcotic Drugs and Psychotropic Substances have several medical and scientific uses. However, they can be and are also abused and trafficked. India's approach towards Narcotic Drugs and Psychotropic Substances is enshrined in Article 47 of the Constitution of India which mandates that the 'State shall endeavour to bring about prohibition of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health'

Purpose:

To provide guidelines governing adequate control for procurement, proper storage, dispensing and record keeping of Narcotic and Psychotropic Drugs in Hospital.

Scope:

All the important activities related to the procurement, storage, dispensing and record keeping of Narcotic and Psychotropic Drugs in accordance with the Delhi Narcotic Drug Rules, 1985 as well as Drugs and Cosmetics Act, 1940 and Rules framed there under.

Definition:

a) Narcotic Drugs are the addictive drugs that reduce the user's perception of pain and induce euphoria (a feeling of exaggerated and unrealistic well-being). They are substances that lead to increasing tolerance and physiological dependence. They have a potential for abuse and/or addiction.
b) Psychotropic Drugs - Any drug capable of affecting the mind, emotions, and behavior.

Storage:

The Narcotic and Psychotropic Drugs must be stored under lock and key in a separate cupboard.

- Strict compliance of statutory requirements must be adhered to as provided under the Narcotic
- Drugs Rules, 1985, Drugs & Cosmetics Act, 1940, Drugs & Cosmetics Rules, 1945 and Pharmacy Act, 1948.
- Narcotic drugs and psychotropic substances must only be dispensed by a pharmacist against a proper prescription of a doctor authorized for the purpose.
- Narcotic drugs and psychotropic substances must be procured and stored in such a manner so as to preclude their falling into the hands of unauthorized persons.
- The storage area for the narcotic drugs and psychotropic substances may be opened and accessed by specific Pharmacist in-charge and Nursing Sister in-charge of respective department.
- Cupboard or safe in which narcotic drugs and psychotropic substances are stored may be opened and accessed only when substances belonging to these categories are being placed into or taken out from the cupboard or room.
- Pharmacist in-charge must check physically at least once daily the stock of narcotic and psychotropic drugs stored. The same must be recorded in stock register and verified by the officer in-charge with signature and date.
- The prescribing practitioner shall be responsible in case the prescription does not conform to statutory regulations. Nursing station shall ensure the entry of batch number in the prescription form while administering.
- Appropriate registers shall be maintained to have information on usage. A proper record of their uses, administration and disposal shall be maintained at all the places wherever narcotic drugs are stored. The narcotic drugs register must incorporate a record of all receipt and issue involving narcotic drugs. The narcotic drugs register must be a bound register with consecutively numbered pages. A separate page must be used for each narcotic drug.
- Pharmacist shall be notified if any medicines or register is missing.