# HOSPITAL PHARMACIST PRACTICAL TRAINING MODULE

STATE INSTITUTE OF HEALTH AND FAMILY WELFARE
UTTAR PRADESH

# ACKNOWLEDGEMENTS


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# MESSAGE

**Shri Brajesh Pathak**
**Hon'ble Deputy Chief Minister**
**Minister of Medical Health and Family Welfare**
**Department Government of Uttar Pradesh**

A practical manual of hospital Pharmacy expose the perception of administration, techniques, principles, and working in hospitals. Comprehensive knowledge of this subject is crucial for a person who as a pharmacist in the hospitals. This manual is a pursuit to deliver a unified analysis of different aspects of the hospital system of diagnosis.

Considering the above stated facts, module on practice of hospital pharmacy is a minimum standard practice to be offered in hospital. Through this, pharmacist in medical services in Uttar Pradesh, will be exposed to much needed training, thus ensuring that management of hospital pharmacy is crucial and this could be achieved through staggered approaches.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts to continue developing such module on hospital pharmacy for the benefit of pharmacist in medical services in Uttar Pradesh that ultimately benefit their hospital and patients too.

**(Brajesh Pathak)**

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# MESSAGE

**Shri Mayankeshwar Sharan Singh**

**Hon'ble State Minister**
**Medical Health and Family Welfare**
**Department Government of Uttar Pradesh**

Pharmacists work in medical services are responsible for dispensing of medications, quality testing, formulating and re-formulating dosage forms, monitoring and reporting drug safety, and preparing budges for medications. They are also responsible for medication storage and planning for medication quantities for their hospitals. The specialized hospitals have pharmacy-managed clinics for some specialized areas, depending on the specialty of pharmacists who are trained in specific techniques.

In order to further strengthen the pharmacists, it helps in understanding a range of common medications and its management, hospital pharmacy practical manual for pharmacist in medical services in Uttar Pradesh is one of the good interventions in states growth.

I am happy that the team at State Institute of Health & Family Welfare, Uttar Pradesh along with the experts from the field, have come up with such an intensified and detailed manual for pharmacist in medical services in Uttar Pradesh.

I wish team at SIHFW success in their endeavors of aiding an improved medical service intervention through such manual on hospital pharmacist practical guide.

**(Mayankeshwar Sharan Singh)**

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# FOREWARD

**Shri Partha Sarthi Sen Sharma**

**Principal Secretary**
**Department of Medical, Health and Family Welfare**
**Government of Uttar Pradesh**

When we hear the word 'pharmacy', the first thought that strikes our mind is dispensing and supplying medications required by the patients. But is that the only job of a pharmacist? Along with the healthcare environment, the role of hospital pharmacists is evolving like never before!

While delivering medications is the utmost priority of the pharmacy department, their role extends far beyond – rightly in patient care. The pharmacy department eases care transitions by addressing medication adherence, reducing the occurrence of adverse drug events, and lowering readmission of patients through optimal services such as bedside prescription, prompt counseling before discharge, and telephonic consultations.

Pharmacists make sure that the prescribed medications are suitable for the patients, advise patients according to their symptoms, supporting patients to make healthier choices, directing them towards nutritious diet and suitable exercises.

Considering the complexity and ever evolving nature of Pharmacists, this module on Continuing Medical Education (CME) on Hospital Pharmacy Practical training manual for Pharmacists in Health & Medical Services in Uttar Pradesh, is an excellent tool that will assist Pharmacist in navigating their roles effectively.

I congratulate the faculties of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

**(Partha Sarthi Sen Sharma)**

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# MESSAGE

**Dr. Brijesh Rathor**

**Director General**
**Medical Health and Family Welfare**
**Uttar Pradesh**

Hospital pharmacists have become an integral part of the patient care team for both inpatient and outpatient care. Pharmacists have become involved in medication management in a number of outpatient clinics, such as anticoagulation management, asthma and chronic obstructive pulmonary disease, HIV, and tuberculosis clinics. The pharmacist's role as a drug expert involves medication reconciliation, management of drug-related problems, and patient education.

Pharmacy services have been evaluated for clinical, humanistic, and economic outcomes and have demonstrated a high value to other healthcare professionals. The success of hospital pharmacy practice can be attributed to a strong hospital pharmacy organization and it encouraged hospital pharmacy practice changes toward more advanced knowledge and skills of pharmaceutical care specialties.

Considering the above stated facts, hospital pharmacy practical training manual, State Institute of Health & Family Welfare, Uttar Pradesh with the help of subject matter experts has provided a comprehensive, coherent and insightful module for pharmacist.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

**(Dr. Brijesh Rathor)**

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# MESSAGE

**Dr. Shailesh Kumar Srivastava**

**Director General (Training)**
**Medical Health and Family Welfare**
**Uttar Pradesh**

Hospital pharmacists have become an integral part of the patient care team for both inpatient and outpatient care. Pharmacists have become involved in medication management in a number of outpatient clinics, such as anticoagulation management, asthma and chronic obstructive pulmonary disease, HIV, and tuberculosis clinics.

The pharmacist's role as a drug expert involves medication reconciliation, management of drug-related problems, and patient education. These pharmacy services have been evaluated for clinical, humanistic, and economic outcomes and have demonstrated a high value to other healthcare professionals.

The success of hospital pharmacy practice can be attributed to a number of reasons. One of them is the strong hospital pharmacy organization. Many professional organizations and communities of practice (COPs) have also inspired these changes.

Considering the above stated facts, this module on Continuing Medical Education (CME) on Hospital Pharmacy Practical training manual for Pharmacists in Health & Medical Services in Uttar Pradesh, State Institute of Health & Family Welfare, Uttar Pradesh with the help of Subject Matter Experts has provided a comprehensive, coherent and insightful module for Pharmacists thus equipping them with the required necessary knowledge for successful management of hospital pharmacy.

I congratulate the best to the faculties of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

**(Dr. Shailesh Kumar Srivastava)**

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# MESSAGE

**Dr. Narendra Agrawal**

**Director General-Training**
**Medical, Health and Family Welfare**
**Uttar Pradesh**

For many years, the role of the hospital pharmacist was limited to procurement, dispensing, and counseling. Shortages in hospital pharmacists contributed to this limitation. Moreover, many problems, including lack of training, education, and administrative framework, delayed the initiation of clinical pharmacy practice in hospitals.

Clinical pharmacy services and clinical pharmacy awareness are rapidly increasing nowadays in many governmental and private hospitals. Field hospital pharmacists are contributing to patient care in many ways; specialized medical centers are witnessing clinical pharmacists attending bed rounds with physicians and regularly making pharmacotherapeutic recommendations, identifying and resolving drug therapy problems, preparing intravenous admixtures, compounding total parenteral nutrition preparations, and performing amino glycoside dosing.

They also actively participate in patient counseling and nurse education. Many hospital pharmacists are now active members of pharmacy and therapeutics committees within their respective hospitals, making an effort to align with physicians to follow standard treatment guidelines. Despite all these, there are issues that remain to be addressed regarding optimal functioning of Pharmacists.

State Institute of Health & Family Welfare, Uttar Pradesh with the help of Subject Matter Experts has developed an extensive and up to date module on Continuing Medical Education (CME) on Hospital Pharmacy Practical training manual for Pharmacists in Health & Medical Services in Uttar Pradesh that deals with all the underlying nuances and provides a comprehensive, coherent and insightful module for Pharmacists.

I applaud the faculties of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

**(Dr. Narendra Agrawal)**

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# ACKNOWLEGMENT

**Dr. Rajaganapathy R.**
I.A.S
**Director**
**State Institute of Health and Family Welfare**
**Uttar Pradesh**

In general hospital pharmacy means dispensing of medicines in a hospital. But actually it is not so. Medication therapies and their delivery systems are becoming more and more complex. Also there is erosion in patient care, much more medication-error, more hospitalization, more stay of patients, more costly treatment, irrational drug therapy etc. These are due to wrong handling of drugs, improper patient counseling, adverse drug reaction, medication error, lack of drug information center, lack of quality assurance of drugs and improper dispensing of medicines in inward & outdoor etc.

Earlier hospital pharmacists role were limited to storage and dispensing. Now due to advancement of Pharmacy curriculum and Pharmaceutical Technology, hospital pharmacists operate in different departments in a set amount of time including clinical wards and medicinal processes. Working in rotation allows pharmacists to develop well-rounded skill sets in every specialization that ultimately promotes the safe use of medications and improves overall patient outcomes.

In the light of these above stated facts, this module on Continuing Medical Education (CME) on Hospital Pharmacy Practical training manual for Pharmacists in Health & Medical Services in Uttar Pradesh, covers all the aspect in details.

I acknowledge the sincere efforts made by the faculties of State Institute of Health & Family Welfare, Uttar Pradesh and by subject matters experts namely Prof. (Dr.) Irfan Aziz-Principal, School of Pharmaceutical Science, Integral University, Lucknow, M.Pharm, PhD, Prof. Sanjay Kumar Yadav, M.Pharm, PhD-Associate Professor, Dr. Shakuntala Misra National Rehabilitation University, Lucknow, Dr. Vimal Kumar Yadav, M.Pharm, PhD-Associate Professor, Institute of Pharmacy, Dr. Ram Manohar Lohia Awadh University,Ayodhya, U.P., Dr. Ahsas Goyal, M.Pharm, PhD-Assistant Professor, Institute of Pharmaceutical Research, GLA University, Mathura, U.P., Dr. Vishal Kumar Vishwakarma, M.Pharm, PhD-All India Institute of Medical Sciences, New Delhi and Mr. Anil Kumar Chaudhary- Pharmacist, MCH Indira Nagar Lucknow Department of Medical & Health, Govt of UP in developing such a comprehensive, coherent and insightful module for Medical Of

**(Dr. Rajaganapathy R.)**

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# MESSAGE

**Dr Sushma Singh**

**Director Paramedical**
**Directorate of Medical and Health Services,**
**Uttar Pradesh, Lucknow**

Provision of quality health care to the people is a commitment of state government. Availability of quality medicines and their rational use is important for this to be achieved. Ensuring that essential medicines are available for the patients at all times and they are rationally used requires an awareness of the multiple steps involved in the "Medicine cycle", if the aim of ensuring that the right medicines is available through pharmacist for the right patient at all times has to be fulfilled.

Selection of a list of medicines, assessment of the quantity of medicines, procurement, storage, distribution, prescribing, administration, dispensing, disposal of medicines, well informed patient, monitoring of medicine cycle, education of pharmacist is required on a regular basis to ensure that quality medicines are available for the patients at all times and they are rationally used.

This training manual refers to the continuing development of the multi-faceted competencies inherent in hospital pharmacy, covering wider domains of professionalism needed for high quality professional performance. Considering this fact, State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts has provided a comprehensive, coherent and insightful module for pharmacist.

I congratulate the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a noble job.

31/01/24

**(Dr Sushma Singh)**

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## HOSPITAL PHARMACIST PRACTICAL TRAINING MODULE

## INTRODUCTION

The "Hospital Pharmacist Practical Training Module" is a comprehensive program meticulously crafted to empower pharmacists with the essential knowledge and skills required for delivering excellence in patient care within a hospital setting. This newly developed module is a response to the evolving healthcare landscape and the growing demand for pharmacists to play an integral role in assuring the safe, effective, and rational use of medicines.

In today's dynamic healthcare environment, hospital pharmacists serve as key players in the journey toward improving patient outcomes and enhancing the quality of healthcare. The module authenticates the pivotal role that pharmacists in pharma practice, as an expert and trains junior members who can discharge their duties very efficiently.

**Objectives**

- **To Strengthen prescription Management**: The module provides an opportunity to inculcate the patient's safety and evolve them as experts and the intern ensures the patient's health care.
- **To Dispense drugs accurately**: Guiding pharmacists for the correctness of labeling, packaging, storage disposal, etc. And maintaining the inventory up to date.
- **To make experts in Clinical Pharmacy**: provides a comprehensive knowledge of pharmacotherapy, therapeutic drug monitoring, drug interactions, and side effects.
- **To advocate Counselling**: The major focus shall be on developing soft and hard skills with sound knowledge, and developing professionalism to address the patients' queries.
- **To adopt Hospital management**: Develop multifaceted responsibilities such as hospital administration, drug procurement, accreditations, collaborations, and memorandum of understanding with multinational hospitals and actively involved in the pharmacovigilance program of India.

**Embracing Diversity and Education**

This training module is designed to embrace the diversity of hospital pharmacists and recognize the importance of education and training in pharmacy services provided. It acknowledges that teaching hospitals, in particular, are destinations of expertise, in which pharmacists serve as potential sources of information on the safe use of drugs.

The Hospital Pharmacist Practical Training Module is aimed at transforming soft and hard skills and advanced knowledge in hospital settings. It addresses a pivotal role encompassing patient safety, drug dispensing, clinical pharmacy services, patient counseling, and the complexity of hospital pharmacy practice.

## MODULE -A

## PHARMACIST'S ROLE IN A HOSPITAL SETTING

In a hospital setting, pharmacists play a critical role in the healthcare team. They are responsible for ensuring the safety and usefulness of medications in patients. Some aspects include:

- **Medication Management**: Pharmacists are involved in drug procurement, storage, preparation, dispensing, and disposal. Pharmacists work closely with other healthcare professionals to ensure that patients receive the prescribed drug with the proper dose and route of administration.
- **Procurement**: Pharmacists procure the standard drugs from the standard manufacturer and keep the intended stock from time to time based on the inventory details.
- **Storage of drugs**: Maintain the prescribed storage conditions and adhere as per the regulatory norms.
- **Dispensing**: Pharmacists check the prescriptions, dosage, date of manufacture and expiry, and drug interactions if any in multiple drug prescriptions.
- **Work with a team of health workers**: Pharmacists work closely with nurses, physicians, and other health workers providing complete information related to drug compatibility, potential adverse reactions, and alternative therapies.
- **Clinical Consultation**: Hospital pharmacists provide inputs on drug selection, dosing, and therapeutic monitoring. Expert pharmacists join the physicians on clinic rounds and discuss the treatment interact with the physician and suggest/ recommend accordingly if appropriate as per the latest pharmacotherapy.
- **Recommendations**: Pharmacists can offer recommendations on drug selection, and dosing adjustments based on renal or hepatic function, other conditions and guide optimal medication regimens.
- **Pharmacovigilance**: Pharmacists can assist in managing adverse drug reactions, and alternate treatment and reporting to the concerned authorities.
- **Patient Counselling**: Pharmacists counsel explain in detail to the patient their prescribed medicines, route of administration, potential side effects, and the

importance of storage and timely taking drugs, etc. Pharmacists can explain if there are any queries or concerns convincingly.

- **As a community pharmacist:** Pharmacist will dispense the prescription. Dispensing refers to the process of preparing and giving medicine to a named person on the basis of a prescription. It involves the correct interpretation of the prescriber and the accurate preparation and labelling of medicine for use by the patient.
- **Forensic pharmacists:** Pharmacists is engage in work relating to litigation, the regulatory process, and the criminal justice system.
- **National programs:** Pharmacists will also participating in various national public health programs, and assist effectively with other members of health care team.

**1. Legal and Ethical Considerations in Pharmacy Practice**

- **Regulations and Licensing**: Pharmacists must be aware of and adhere to local, state, and national regulations related to pharmacy practice. They should also ensure to possess a valid pharmacy license.
- **Compliance**: Pharmacists must stay updated with local, state, and national regulations governing pharmacy operations, drug dispensing, storage, and record-keeping.
- **Licensing**: Holding a valid and current pharmacy license is mandatory. Pharmacists must fulfill continuing pharmacy education requirements to maintain their licenses.
- **Confidentiality**: Patient confidentiality is very important. Pharmacists should understand and uphold laws like the Health Insurance Portability and Accountability Act (HIPAA) to protect patient information.
- **HIPAA Compliance**: Understanding and strictly adhering to the Health Insurance Portability and Accountability Act (HIPAA) is essential. This involves safeguarding patient health information, ensuring it's shared only on a need-to-know basis.
- **Protected Health Information (PHI)**: Pharmacists must handle and store patient records securely to protect patient's privacy. Sharing PHI without proper authorization violates HIPAA regulations.
- **Ethical Problems**: Pharmacists may encounter ethical problems in their practice. Training should include a master plan that encourages ethical decision-making, such as whether to dispense medication when there are doubts about its usefulness.

- **Informed Decision-Making**: Pharmacists encounter problems like dispensing a medication when it is questionable. They must balance patient autonomy with professional judgment, considering potential harm versus benefit.
- **Patient Advocacy**: Ethical problems might involve advocating for patients' best interests, even if it conflicts with a prescriber's order. Pharmacists may need to communicate concerns or refuse to dispense if they suspect medication misuse or cause harmful interactions.

**2. Additional Aspects**

- **Conflict of Interest**: Pharmacists should avoid situations where personal interests conflict with professional responsibilities, ensuring patient care remains as the top priority.
- **Professional Boundaries**: Maintaining appropriate boundaries with patients to uphold professionalism and prevent any potential ethical violations.
- **Refusal to Dispense**: Instances may arise where a pharmacist morally objects to dispensing a medication due to religious, ethical, or personal beliefs. In such cases, referring to another pharmacist or resource is a right approach.
- Continuous pharmacy education and training in ethical decision-making equip pharmacists to navigate these complexities effectively. It involves understanding the law, integrating ethical principles into practice, and developing critical thinking skills to address challenging situations while prioritizing patient welfare and ethical integrity.

**3. Handling and Documentation**

- **Controlled Substance Scheduling**: Pharmacists must understand how controlled substances are categorized and regulated, including Schedule I to V drugs.
- **Security and Record-Keeping**: Training should cover the storage norms and handling of controlled substances to prevent theft misuse and diversion. Pharmacists must also maintain meticulous records of controlled substance transactions.
- **Dispensing Requirements**: Understanding the specific requirements for dispensing controlled substances, such as verifying patient identification and maintaining prescription records, is essential.

**4. Ensuring Patient Safety and Confidentiality**

- **Medication Safety**: Pharmacists should be experts in error prevention strategies, such as double-checking doses and identifying look-alike/sound-alike, spell-like medications to prevent medication errors.
- **Patient Confidentiality**: Training should emphasize the importance of protecting patient information, whether it's electronic health records or verbal communication. Understanding the legal and ethical obligations in this regard is critical.
- **Adverse Event Reporting (Pharmacovigilance)**: Pharmacists should know how to report adverse drug events and medication errors to the appropriate authorities, helping improve patient safety in the long term. Pharmacists should undergo training for Pharmacovigilance programs conducted by the Indian Pharmacopeia Commission Government of India.
- This training should be practical and incorporate real-world scenarios to help pharmacists internalize these concepts. Continuous education and adherence to professional codes of conduct are essential to ensure the highest standards of pharmacy practice in a hospital setting.

**5. The Role and Importance of a Drug Information Centre in a Hospital**

A Drug Information Centre (DIC) in a hospital plays an important aspect in providing precise, reliable, and timely drug-related information to healthcare professionals. Training should be mandatory along with use of software.

- **Information Clusters**: The DIC serves as a centralized source of drug-related information, supporting healthcare professionals in making informed decisions regarding drug therapy, patient care, and treatment plans.
- **Safety and Efficacy**: DICs help ensure the safety and efficacy of drug use within the hospital. They contribute to minimizing medication errors and adverse drug reactions.
- **Support for Research and Education**: DICs often support research initiatives within the hospital, helping to evaluate and disseminate the latest drug-related findings. They are also involved in the education and training of healthcare staff on drug-related topics.

- **Updated Patient Care**: By providing healthcare professionals with accurate drug information, DICs directly contribute to improved patient care.

**6. Patient-centred pharmaceutical care**

Patient-centred pharmaceutical care is a pivotal approach that places the patient at the forefront of pharmacy practice. It's a holistic method that focuses on optimizing patient outcomes through personalized medication management and fostering a strong pharmacist-patient relationship.

**6.1 Personalized Medication Management**

Individualized Treatment Plans and custom-made medication regimens to meet the unique needs, preferences, and health goals of each patient.

- **Comprehensive Medication Reviews**

Assessing the patient's complete medication profile to identify potential interactions, duplications, and adverse effects.

**6.2 Collaborative Patient-Provider Relationship**

- **Open Communication**: Encouraging dialogue between the pharmacist and patient to ensure a clear understanding of medication usage, potential side effects, and adherence strategies.
- **Shared Decision-Making**: Involving patients in decisions about their treatment plans, considering their values and preferences.

**6.3 Education and Empowerment**

- **Medication Counselling**: Providing detailed information about prescribed medications, including dosage, administration instructions, and potential side effects.
- **Health Literacy**: Educate patients with knowledge to make informed decisions about their health, treatment options, and adherence strategies.

**6.4 Continual Monitoring and Follow-up of Treatment**

- **Assessment of Treatment Outcomes**: Regularly evaluating the effectiveness of medications and adjusting treatment plans for appropriate treatment.

- **Follow-up Care**: Engaging in ongoing follow-up to address any concerns, assess adherence, and ensure optimal medication efficacy.

**6.5 Holistic Approach to Patient Wellness**

- **Consideration of Whole Health**: Recognizing the interconnectedness of physical, mental, and emotional aspects of health in medication management.
- **Healthcare Teams**: Working in conjunction with other healthcare providers to deliver comprehensive care that meets all aspects of patient wellness.

**6.6 Adherence Enhancement Strategies**

- **Identifying Barriers to Adherence**: Understanding challenges that patients may face in adhering to medication regimens, and implementing strategies to overcome these obstacles.

**6.7 Significance and Benefits**

- **Optimized Patient Outcomes**: Patient-centred care enhances medication adherence, reduces adverse effects, and improves overall health conditions.
- **Patient's Satisfaction**: Educating patients with knowledge and involving them in decision-making leads to higher satisfaction and trust in healthcare providers.
- **Enhanced Safety and Quality of Care**: Thorough monitoring and personalized approaches minimize risks associated with medication use.

Patient-centred pharmaceutical care goes beyond just dispensing medications. It involves fostering a compassionate and collaborative relationship between pharmacists and patients to ensure that medication therapy aligns with the patient's values, preferences, and health needs, ultimately leading to improved health outcomes and enhanced well-being.

## MODULE -B

## Precision in Action: Delivering Current and Precise Drug Information to Healthcare Professionals

### 1. How to Provide Accurate and Up-to-Date Drug Information to Healthcare Professionals

- **Comprehensive Drug Databases**: DIC staff should be trained to access and navigate comprehensive drug databases and resources. Training should include instruction on how to retrieve data from sources like Micromedex, Lexicomp, or the hospital's drug formulary.
- **Evaluating Information**: It's mandatory to teach DIC personnel how to critically evaluate the information they find, ensuring its reliability, relevance, and appropriateness for the specific clinical scenario.
- **Effective Communication**: Training should include communication techniques with respect to soft and hard skills, as DIC staff often need to interpret and convey complex drug information to healthcare professionals in an understandable and actionable manner.
- **Timeliness**: Point out the importance of providing information promptly. Healthcare professionals rely on the DIC for rapid responses to their drug-related queries.

### 2. Drug Dosing and Administration

**Time of Drug Administration:**

Pharmacists guide healthcare professionals and patients in comprehending the significance of the timing of medication administration concerning foods. The timing of medications about food can significantly influence their absorption, effectiveness, and potential side effects.

**Table 1** represents different timing of medication.

**TABLE 1: Drug Administration Timing:**

| Timing | Description | Examples |
|---|---|---|
| Before Meal | Optimal absorption on an empty stomach | Antibiotics like amoxicillin |
| After Meal | Reducing stomach irritation | NSAIDs like ibuprofen |
| **Timing** | **Description** | **Examples** |
| Before Meal | Optimal absorption on an empty stomach | Antibiotics like amoxicillin |
| Before Meal (AC) | Optimal Absorption on an Empty Stomach | Antibiotics: Amoxicillin, Erythromycin |
| After Meal (PC) | Reducing Stomach Irritation, Minimizing GI Side Effects | NSAIDs: Ibuprofen, Naproxen |
| With Meal | Minimizing Gastric Distress, Enhancing Absorption of Others | Thyroid Medications, Some Statins |
| Empty Stomach | Enhancing Absorption of Specific Medications | Bisphosphonates, Some Antifungals |
| Bedtime | Reducing Insomnia or Enhancing Effectiveness | Sleep Medications, Certain Antidepressants |
| Before Meal (AC) | Optimal Absorption on an Empty Stomach | Antibiotics: Amoxicillin, Erythromycin |
| Before Meal (AC) | Optimal Absorption on an Empty Stomach | Amoxicillin, Erythromycin, Cefuroxime |
| After Meal (PC) | Reducing Stomach Irritation, Minimizing GI Side Effects | Ibuprofen, Naproxen, Aspirin |
| With Meal | Minimizing Gastric Distress, Enhancing Absorption of Others | Levothyroxine, Atorvastatin, Metformin |
| Empty Stomach | Enhancing Absorption of Specific Medications | Alendronate, Itraconazole, Thyroid Hormones |
| Bedtime | Reducing Insomnia or Enhancing Effectiveness | Zolpidem, Trazodone, Amitriptyline |
| 30 minutes Before Meal (AC) | Optimal Absorption on a near-empty stomach | Penicillin, Tetracyclines, Levodopa |
| 1 hour After Meal (PC) | Stomach Protection & Extended Duration | Omeprazole, Esomeprazole, Ranitidine |
| 2 hours After Meal (PC) | Alleviating Stomach Distress | Diclofenac, Meloxicam, Celecoxib |
| 3 hours After Meal (PC) | Delayed Action for Absorption & Efficacy | Glimepiride, Gliclazide, Aripiprazole |
| 4 hours After Meal (PC) | Delayed Action with Reduced Food Interaction | Diclofenac Sodium XR, Tramadol ER |
| 15-30 minutes Before Meal (AC) | Rapid Onset of Action | Insulin (Rapid-acting), Alprazolam |

| | | |
|---|---|---|
| 30-45 minutes Before Meal (AC) | Rapid Absorption with Food Interaction | Riluzole, Cefpodoxime, Doxycycline |
| 1 hour Before Meal (AC) | Optimal Absorption with Reduced Food Interaction | Azithromycin, Levofloxacin, Isoniazid |
| 2 hours Before Meal (AC) | Optimizing Absorption and Minimizing Food Interaction | Dicloxacillin, Cloxacillin, Cefdinir |
| 1 hour After Meal (PC) | Reducing Stomach Upset & Long-acting Effect | Morphine ER, OxyContin, Propranolol |
| 2 hours After Meal (PC) | Gastric Protection & Extended Release | Metoprolol ER, Acetaminophen ER |
| 4 hours After Meal (PC) | Delayed Action and Reduced Food Interaction | Naproxen Sodium, Indomethacin |
| 6 hours After Meal (PC) | Prolonged Release and Delayed Absorption | Glipizide ER, Metformin SR |
| 8 hours After Meal (PC) | Extended Release with Gastric Protection | Tramadol ER, Venlafaxine ER |

- **Before Meal (AC)**: Medications that require an empty stomach for optimal absorption are advised to be taken before meals. For instance, antibiotics like Amoxicillin or Erythromycin are often administered on an empty stomach to maximize their absorption in the bloodstream.
- **After Meal (PC)**: Some medications, particularly non-steroidal anti-inflammatory drugs (NSAIDs) such as Ibuprofen or Naproxen, are suggested to be taken after meals to minimize stomach irritation and reduce the risk of gastrointestinal side effects.
- **With Meal**: Certain medications are recommended to be taken with food to mitigate gastric distress or to enhance the absorption of other medications. For instance, some thyroid medications or specific statins are advised to be taken with meals to reduce stomach discomfort and improve absorption.
- **Empty Stomach**: Certain medications, such as bisphosphonates or some antifungal medications, require an empty stomach for optimal absorption. These drugs are advised to be taken on an empty stomach to ensure their effectiveness.
- **Bedtime**: Some medications are recommended to be taken at bedtime to either reduce insomnia as a side effect or to enhance their effectiveness. Sleep medications or certain antidepressants fall under this category.

### 3. The Impact of Meal Timing on Medication Efficacy and Safety

- Pharmacists play a critical role in explaining the importance of administering medications before or after meals.
- **Optimizing Absorption**: Educating patients on the significance of taking certain medications before meals to enhance their absorption.
- **Minimizing Side Effects**: Clarifying the rationale behind taking certain medications after meals to reduce gastrointestinal irritation or side effects.
- **Incompatibility with Drug Administration**: Drug-Drug and Food-Drug Interactions: Pharmacists provide detailed insights into incompatibilities, encompassing drug-drug and food-drug interactions such as Pharmacokinetic, pharmacodynamic, and chemical.

| Interaction Type | Explanation | Examples |
|---|---|---|
| Drug-Drug Interaction | Negative effects if taken together | Interaction between calcium-containing antacids and antibiotics |
| Food-Drug Interaction | Food influence on medication effectiveness | Grapefruit juice altering drug metabolism |
| Drug-Drug Interaction | Negative effects if taken together | Interaction between calcium-containing antacids and antibiotics |
| Drug-Drug Interaction | Negative effects if taken together | Warfarin + Aspirin: increased bleeding risk |
| | | Simvastatin + Amiodarone: increased muscle toxicity |
| | | Methotrexate + Probenecid: decreased MTX excretion |
| | | Oral Contraceptives + Antibiotics: reduced contraceptive effectiveness |
| | | MAOIs + SSRIs: serotonin syndrome risk |
| Food-Drug Interaction | Food influence on medication effectiveness | Grapefruit juice + Statins: increased statin concentration |

| | | |
|---|---|---|
| | | Dairy + Tetracyclines: reduced antibiotic absorption |
| | | Leafy Greens + Warfarin: altered INR levels |
| | | Tyramine-rich foods + MAOIs: hypertensive crisis risk |
| | | High-Fat Meals + Insulin: altered insulin action |
| | | Alcohol + Painkillers: increased CNS depression risk |
| | | Licorice + Digoxin: increased risk of arrhythmias |
| | | Coffee + Bronchodilators: increased side effects |
| | | Salt + Diuretics: decreased drug efficacy |
| | | Vitamin K-rich foods + Blood Thinners: altered INR levels |

- Incompatibility in medication administration encompasses drug-drug and food-drug interactions, representing a critical area within pharmacy practice. Pharmacists provide detailed insights into these interactions, crucial for understanding how certain drugs can interact with each other or with food, impacting their effectiveness, absorption, and the potential for adverse effects. This comprehensive knowledge guides healthcare professionals and patients in safe and effective medication management.

**4. Drug-Drug Interactions**

Drug-drug interactions occur when two or more medications interact in a way that alters their intended effects. These interactions can result in decreased effectiveness, increased side effects, or unexpected adverse reactions. Various classes of medications can interact, affecting their absorption, metabolism, or elimination.

Examples of Drug-Drug Interactions:

- **Anticoagulants and Aspirin**: Combining warfarin with aspirin increases the risk of bleeding due to their blood-thinning effects.
- **Statins and Macrolide Antibiotics**: The combination can lead to an increased risk of muscle toxicity or a condition called rhabdomyolysis.
- **Methotrexate and Probenecid**: Probenecid can reduce the excretion of methotrexate, causing toxic levels in the body.
- Understanding these interactions is vital to prevent adverse effects and optimize therapeutic outcomes. Pharmacists educate healthcare professionals and patients about these potential risks, highlighting the importance of awareness and communication to avoid harmful interactions.

**5. Food-Drug Interactions**

Food-drug interactions occur when certain foods alter the effects of medications or impact their absorption and metabolism. Foods can affect drug concentrations in the body, potentially diminishing or enhancing their intended effects.

Examples of Food-Drug Interactions:

- **Grapefruit Juice and Statins**: Grapefruit juice inhibits the breakdown of statins, leading to increased drug concentrations in the body and an elevated risk of side effects.
- **Dairy Products and Tetracyclines**: Calcium in dairy can bind to tetracycline antibiotics, reducing their absorption and effectiveness.
- **Warfarin and Vitamin K-rich Foods**: Vitamin K can counteract the effects of warfarin, altering its ability to prevent blood clotting.
- Pharmacists play a crucial role in advising patients about these interactions to prevent unfavorable consequences. Their guidance helps patients make informed choices about their diet and medication timing, ensuring the medications' safety and efficacy.

**6. Preventing Incompatibilities**

Preventing drug-drug and food-drug interactions involves comprehensive medication review, patient education, and communication among healthcare professionals.

**7. Strategies to Prevent Incompatibilities:**

- **Medication Review**: Pharmacists conduct thorough medication reviews to identify potential interactions, considering both prescription and over-the-counter medications.
- **Patient Counselling**: Materials emphasizing the significance of understanding drug-food and drug-drug interactions.

**8. Resources and Tools for Research and Reference**

- **Pharmacopoeias**: Familiarize DIC staff with various pharmacopeia's such as the United States Pharmacopeia (USP), British Pharmacopoeia (BP), and Indian Pharmacopoeia (IP). These are essential references for drug standards and monographs.
- **Medical Journals and Databases**: DIC personnel should be proficient in accessing medical literature databases like PubMed, Google Scholar, Scopus, Science Direct, and international journals reported articles and clinical trial registries for the latest research and clinical studies. It is essential to organize the course related to databases and other inputs.
- **Hospital Formulary**: Highlight the importance of the hospital's drug formulary as a primary reference for medication selection and guidelines specific to the hospital's practice.
- **Clinical Guidelines**: Encourage the use of clinical guidelines from reputable organizations such as the World Health Organization (WHO) or the Centres for Disease Control and Prevention (CDC) to inform clinical decisions.
- **Continuing Education**: Make it mandatory the need for continuous learning and staying updated on new drugs, therapies, and research through continuing education programs and professional organizations.

Effective training in this section should include practical exercises, mock consultations, and access to the tools and resources commonly used in drug information centres. Additionally,

role-playing exercises can help trainees practice communication and information delivery to healthcare professionals effectively.

### 9. Handling and Documentation of Controlled Substances

Controlled substances are medications and chemicals that have the potential for abuse and addiction. Pharmacists in a hospital setting must be well-versed in the regulations, safety measures, and record-keeping required for these substances.

#### 9.1. Controlled Substance Scheduling

Controlled substances are categorized into five schedules (I to V) based on their potential for abuse and medical utility. Understanding this classification is vital:

- **Schedule I**: These substances have a high potential for abuse, no currently accepted medical use in treatment, and a lack of accepted safety for use under medical supervision. Pharmacists should recognize that these are typically illegal drugs.
- **Schedules II-V**: These substances have varying degrees of potential for abuse, accepted medical uses, and safety profiles. Pharmacists should understand the differences between each schedule, as it impacts their handling and dispensing.

#### 9.2. Security and Record-Keeping

Security measures for controlled substances are critical to prevent theft, diversion, and unauthorized access:

- **Storage**: Pharmacists should be trained on storage conditions, which includes having a locked cabinet, vault, or safe designated specifically for controlled substances. These storage areas should be kept secure at all times, and access should be restricted to authorized personnel only.
- **Access Control**: Ensure that access to controlled substances is limited to authorized personnel, and each access instance should be logged and monitored.
- **Audits and Reconciliation**: Regularly conduct audits and reconciliations to account for all controlled substances, identifying any discrepancies or missing medications.

#### 9.3. Dispensing Requirements

Pharmacists must adhere to specific requirements when dispensing controlled substances:

- **Verification of Prescriptions**: Pharmacists should always verify the authenticity of prescriptions for controlled substances. This includes confirming the prescriber's credentials, ensuring the patient's identification, and checking for any red flags like altered prescriptions.
- **Patient Education**: Patients receiving controlled substances should be educated about the potential for abuse, side effects, and proper use. They should also be informed about the importance of safeguarding their medications.
- **Record-Keeping**: Accurate and thorough records must be maintained for each controlled substance transaction. This includes recording the patient's name, address, and the prescription details. Any theft or loss of controlled substances must be reported promptly to the appropriate authorities.
- **Regulatory Compliance**: Pharmacists should be aware of federal, state, and local regulations governing controlled substances. Compliance with the Drug Enforcement Administration (DEA) regulations and state pharmacy boards is crucial.

Training in this section should include both theoretical knowledge and practical exercises. Simulated master plan can help pharmacists practice verifying prescriptions, handling suspicious situations, and maintaining proper records. It is essential to continually update pharmacists on changes in regulations or scheduling that may impact the handling of controlled substances.

## MODULE -C

## Latest Updates concerning the DCGI

The Drug Controller General of India (DCGI) plays a crucial role in regulating pharmaceuticals in India. Information about the latest updates and regulations is vital for pharmacists to ensure they comply and provide safe and effective pharmaceutical care.

### 1. Importance of latest information

- **Patient Safety**: New regulations often come into effect to enhance patient safety and ensure the quality of pharmaceuticals. Understanding these updates is critical to providing safe and effective patient care.
- **Legal Compliance**: Pharmacies must adhere to DCGI regulations to avoid legal consequences. Non-compliance can lead to fines, closure, or even criminal charges.
- **Professional Responsibility**: Pharmacists have a professional responsibility to be updated about regulatory changes. It's part of their commitment to ethical pharmacy practice.

### 2. Sources of DCGI Updates

- **DCGI Website**: Encourage pharmacists to regularly check the official DCGI website for the latest announcements, guidelines, and circulars.
- **Pharmacy Associations**: Pharmacists can also stay informed through pharmacy associations and organizations that often provide updates and interpret regulatory changes.
- **Government Notifications**: Sometimes, regulatory updates are published in government gazettes or notifications. Pharmacists should be aware of these channels.
- **Pharmaceutical Journals**: Encourage pharmacists to regularly read and subscribe to pharmaceutical journals, where the latest research and drug developments are often published.
- **Continuing Education Programs**: Highlight the value of participating in continuing education programs, workshops, and conferences in pharmacy and healthcare.
- **Drug Manufacturer Updates**: Pharmacists should be aware of resources and communications provided by pharmaceutical manufacturers regarding new drugs.

**3. Regular Training on New Drugs and Therapies**

- **In-House Training**: Hospitals may offer in-house training sessions or workshops specifically tailored to introducing and explaining new drugs, therapies, or medical devices.
- **Pharmaceutical Representatives**: Encourage pharmacists to engage with pharmaceutical representatives who can provide information about new drugs and their applications.
- **Webinars and Online Courses**: Pharmacists can benefit from participating in webinars and online courses, which can be a flexible way to stay updated on new advancements.

**4. Application of New Knowledge**

- **Patient Consultation**: Train pharmacists for advanced pharmacotherapy explaining the advantages and disadvantages.
- **Interdisciplinary approach**: Promote collaboration with other healthcare professionals to ensure that new treatment options are integrated into patient care plans effectively.
- **Adverse Event Reporting (Pharmacovigilance)**: Emphasize the importance of reporting any adverse events or side effects associated with newly introduced medications or therapies, contributing to patient safety and ongoing research.

**5. Continuous Learning and Professional competence**

- **Self-assessment**: Encourage pharmacists to regularly assess their knowledge and identify areas where they need further training.
- **Certifications and Specializations**: Discuss opportunities for pharmacists to pursue certifications or specializations in areas like pharmacotherapy or clinical pharmacy.
- **Mentorship and Networking**: Facilitate mentorship programs and networking opportunities where experienced pharmacists can share their knowledge and insights with newcomers.

**6. Regulatory Compliance**

- **Pharmacy Regulations**: Ensure pharmacists understand and adhere to the regulatory requirements concerning new drug approvals, medication safety, and documentation.

**7. Understanding the Impact on Hospital Pharmacy Practice**

Pharmacists must not only be aware of DCGI updates but also understand how these changes affect their daily practice:

- **Medication Procurement**: Changes in regulations may impact the procurement and sourcing of medications. Pharmacists need to adapt their procurement practices to comply with new requirements.
- **Storage and Handling**: New regulations can dictate specific storage conditions or handling procedures for certain medications. Pharmacists must ensure compliance to maintain the integrity and safety of medications.
- **Dispensing Procedures**: Updates may require changes in the way medications are dispensed, including labelling requirements, documentation, or patient counselling.
- **Reporting Requirements**: DCGI updates may introduce new reporting obligations for adverse events or medication errors, which pharmacists need to adhere to.
- **Professional Ethics**: Ensure pharmacists understand that adherence to updated regulations is an ethical obligation. They should consider the patient's best interests and adhere to the highest standards of practice.

**8. Continuous Learning and Adapting**

Pharmacists should be encouraged to engage in continuous learning and professional development to stay current with evolving regulations. They can attend seminars, workshops, and training sessions offered by regulatory authorities or professional organizations to update their understanding of the impact of new regulations on hospital pharmacy practice.

This training section should not only impart knowledge about DCGI updates but also emphasize the importance of a proactive and adaptive approach to regulatory changes in pharmacy practice. Pharmacists should be motivated to keep abreast of regulatory updates and actively incorporate them into their daily routines.

## MODULE -D

### Handling Incompatibility: Ensuring Safety for Patients in Pharmacy Practice

Incompatibility in pharmacy refers to the undesirable reactions that can occur when different drugs or diluents are mixed or administered together. Understanding and managing incompatibilities are essential to ensure patient safety and treatment efficacy.

**1. Drug-drug and Drug-Diluent interactions**

- **Drug-Drug Incompatibilities**: These occur when two or more drugs, when combined, lead to physical or chemical changes that may reduce the effectiveness of one or both drugs or produce harmful effects. Train pharmacists to recognize common drug interactions and their potential consequences.
- **Drug-Diluent Incompatibilities**: This type of incompatibility refers to reactions that occur when a drug is mixed with a diluent (e.g., saline, dextrose) for intravenous administration. Pharmacists should learn how different drugs interact with various diluents, which can affect drug stability and patient safety.

**2. Strategies to Prevent and Manage Incompatibilities**

- **Literature Review**: Pinpoint the importance of referring to reputable drug references, compatibility charts, and manufacturer recommendations when determining potential incompatibilities.
- **Proper Mixing Techniques**: Train pharmacists in the correct procedures for mixing drugs or diluents. This includes considering factors like dilution ratios, temperature, and mixing order.
- **Compatibility Testing**: Educate pharmacists on how to perform compatibility testing when there is uncertainty. This may involve visual inspection, pH measurement, or other appropriate tests.
- **Alternative Routes of Administration**: In cases where incompatibilities are difficult to manage, explore alternative routes of drug administration that minimize risks.

### 3. Practical Examples and Case Studies

- **Intra venous drug Administration**: Provide examples of incompatibilities commonly encountered in intravenous (IV) medication administration, such as the mixing of multiple medications in a single IV line.
- **Total Parenteral Nutrition**: Solution Compatibility: Illustrate the complexities of Total Parenteral Nutrition (TPN) solution compatibility, where various nutrients, vitamins, and medications are mixed for intravenous nutrition.
- **Paediatric and Geriatric**: Considerations: Explain how incompatibilities can be particularly problematic in paediatric and geriatric patients, as they often have unique dosage forms and requirements.
- **Case Studies**: Present real-life case studies where incompatibility issues led to adverse patient outcomes. Encourage trainees to analyse these cases and propose solutions.
- **Practice Scenarios**: Engage pharmacists in role-playing scenarios where they must identify and manage incompatibilities in various clinical settings. This practical experience helps to improve their knowledge and approaches.
- **Medication Reconciliation**: Highlight the importance of medication reconciliation in preventing drug-drug interactions. Pharmacists should be experts in reconciling patients' medication lists to identify potential incompatibilities and propose alternative treatments.

### 4. Ongoing Learning and Monitoring

Stress the need for continuous learning and staying updated on new drugs and compatibility issues. Encourage pharmacists to actively participate in hospital committees that oversee medication safety and compatibility, and to share their knowledge and expertise with other healthcare professionals.

This section of the training module should not only impart knowledge but also provide hands-on experience and problem-solving skills to pharmacists, ensuring they can effectively prevent, identify, and manage incompatibilities in real-world situations.

## MODULE -E

## Healthcare Optimization: Strategic Handling of Prescription Errors, Drug Storage in Hospital Pharmacy

### 1. Medicine Storage Management

Effective store management is essential for a hospital pharmacy to ensure the availability of medications, prevent shortages, reduce waste, and maintain a well-organized and efficient pharmacy operation.

### 2. Proper Inventory Management and Stock Control

- **Inventory Assessment**: Train pharmacists to regularly assess inventory levels to determine when to reorder and how much to order. This may involve the use of inventory control systems and software.
- **Predicting Demand**: Understanding patient needs and historical usage patterns can help forecast demand. Pharmacists should be able to adapt to seasonal variations and changes in patient populations.
- **ABC Analysis**: Introduce the ABC analysis method for categorizing items by their importance, with 'A' items being the most critical to stock and manage.
- **First-In, First-Out (FIFO)**: Emphasize the importance of the FIFO method, which ensures that the oldest stock is used first to minimize wastage.

### 3. Medication Availability and Waste minimisation

- **Safety Stock**: Explain the concept of safety stock—essential medications to prevent shortage during unexpected demand spikes.
- **Expiry medicine stocks**: Teach techniques to reduce medication expiry by rotating stock, closely monitoring expiry dates, and discarding expired medications from the inventory.
- **Return and Disposal Procedures**: Train pharmacists on proper returning procedures for expired or unused medications and safe disposal of hazardous pharmaceutical waste. Awareness of the incarnation of unused and expired drugs.

### 4. Organizing and Labelling Medications for Easy Accessibility

- **Categorization**: Describe effective ways to categorize medications in the storage area, which could include grouping them by therapeutic class, usage frequency, or alphabetical order.
- **Labelling**: Stress the importance of labelling, which should include drug name, strengths, expiry date, and storage conditions.
- **Storage Conditions**: Explain medications that require specific storage conditions, including temperature and humidity, and monitoring procedures.
- **Regular Audits**: Train pharmacists to perform regular audits of inventory and storage conditions to ensure compliance and medication safety.

**5. Technology and Inventory Management Systems**

- **Use of Technology**: Introduce pharmacists to inventory management software and automation tools that can streamline the process, track medication usage, and generate reports for decision-making.
- **Barcode Systems**: Discuss the benefits of using barcode systems for efficient stock management, tracking, and reducing human error.

**6. Training on Emergency and Contingency Planning**

- **Emergency Preparedness**: Ensure pharmacists are well-prepared for emergencies or disasters that may disrupt the supply chain, and understand how to manage stock during such events.

**7. Continuous Improvement and Best Practices (GXP)**

- **Benchmarking**: Encourage pharmacists to benchmark their store management practices against industry best practices and practice continuous improvement.
- **Collaboration:** Emphasize the importance of collaborating with other healthcare departments to meet the unique needs of the hospital.

**8. Regulatory Compliances**

- **Pharmacy Regulations**: Ensure pharmacists are experts in the regulatory requirements concerning pharmacy inventory management, including record-keeping and reporting obligations.

**9. Decoding Drug Names**

Recognizing both brand and generic names of medications is fundamental. Brand names, provided by pharmaceutical companies, are specific to their product, whereas generic names refer to the active ingredient. Understanding the therapeutic use and potential side effects of each medication aids in comprehensive patient education and counselling.

- **Dosage Decoding**

Interpreting the strength and dosage form of medications is critical for accurate dispensing. This involves recognizing the amount of active ingredient per unit (such as milligrams, micrograms, etc.) and understanding different dosage forms like tablets, capsules, solutions, and suspensions. This knowledge helps in verifying the correct medication and ensuring the appropriate dosage is dispensed.

- **Route of Administration**

Determining the intended method of administering the medication is crucial. Prescriptions specify whether the medication should be taken orally, topically, intravenously, intramuscularly etc. Understanding the route of administration is essential to ensure patients take the medication correctly and appropriately.

- **Frequency and Duration**

Comprehending the prescribed schedule and the duration of the treatment plan is vital. Pharmacists need to interpret how often the medication should be taken in a day (daily, twice daily, etc.) and for how long?. This information helps in providing clear instructions to the patient and monitoring their adherence to the treatment plan.

Mastering the interpretation of prescriptions demands a comprehensive understanding of medical terminologies, dosage calculations, and pharmaceutical forms. It is a critical responsibility that directly impacts patient safety and treatment efficacy. Accurate interpretation ensures that patients receive the right medication in the correct dosage, route, frequency, and duration as intended by the prescribing healthcare provider.

**10. Abbreviations and Terminologies**

Prescriptions commonly contain abbreviations and medical jargon. It's crucial to be well-versed in these abbreviations to avoid misinterpretation or errors. Understanding abbreviations such as "od" (once daily), "bid" (twice daily), "PRN" (as needed), and others is vital for accurate dispensing.

Furthermore, knowledge of medical terminologies related to strengths, quantities, and pharmaceutical forms is essential. This knowledge helps in accurately interpreting the prescriber's instructions.

**11. Prescription Errors and Safety Measures**

Prescription errors can pose risks to the patients. Common errors include illegible handwriting, incorrect drug selection, dosage errors, and misinterpretation of instructions. Pharmacists play a vital role in error prevention through various safety measures:

- **Double-checking**: Verifying prescriptions and consulting with prescribers for clarification when in doubt.
- **Technological Interventions**: Using electronic prescription systems to reduce errors related to illegible handwriting.
- **Patient Counselling**: Communicating with patients about their prescriptions to ensure understanding and compliance.
- **Continual Education**: Remaining updated with new medications, dosage forms, and safety protocols to mitigate errors.

In conclusion, a pharmacist's proficiency in understanding prescriptions is paramount for ensuring patient safety and proper medication management. Being well-versed in interpreting prescriptions, understanding medical abbreviations, and mitigating prescription errors are foundational skills in providing effective pharmaceutical care.

**12. Preventing Prescription Errors**

- **Double-checking and Verification**

Verifying prescriptions is a fundamental practice to ensure accuracy. Pharmacists must thoroughly review each prescription for completeness and accuracy. This includes confirming

patient details, medication names, dosages, route of administration, frequency, and duration. If there's any uncertainty or ambiguity, pharmacists consult with prescribers to seek clarification, thereby reducing the chances of misinterpretation and errors.

- **Utilizing Technological Interventions**

The integration of electronic prescription systems significantly reduces errors associated with illegible handwriting and improves accuracy. Electronic prescriptions facilitate the direct transmission of prescriptions from healthcare providers to pharmacists, minimizing transcription errors and enhancing clarity. This technological advancement not only streamlines the prescription process but also reduces the probability of misreading or misinterpreting written prescriptions.

- **Patient Counselling awareness**

Effective communication with patients regarding their prescriptions is crucial. Pharmacists offer counselling to ensure patients understand their medications, including dosage, administration instructions, potential side effects, and the importance of adherence to the prescribed regimen. Patient education helps in improving medication compliance and reduces the likelihood of errors due to misunderstandings.

- **Continuous Professional Education**

Remaining updated with new medications, dosage forms, and safety protocols is vital for pharmacists. Continuous education and training programs keep pharmacists informed about the latest pharmaceutical developments, safety measures, and changes in regulations. This ongoing education ensures pharmacists are equipped with the most current information, reducing the likelihood of errors due to outdated knowledge or unfamiliarity with new medications.

**13. Importance of LASA (Look-Alike Sound-Alike) Drugs**

LASA drugs are medications that share similarities in either their names or appearances, potentially leading to confusion during prescription, dispensing, or administration. These similarities can result in medication errors, leading to accidental overdose or administration of the wrong medication.

**Table: Examples of LASA Drugs**

| LASA Drugs | Description of Similarities | Example Pairings |
|---|---|---|
| Lamictal (lamotrigine) - Lamisil (terbinafine) | Similar names, risk of misreading | Lamictal vs. Lamisil |
| Celebrex (celecoxib) - Celexa (citalopram) | Similar sounding names, potential miscommunication | Celebrex vs. Celexa |
| Zantac (ranitidine) - Xanax (alprazolam) | Pronunciation and spelling resemblance | Zantac vs. Xanax |
| Flomax (tamsulosin) - Fosamax (alendronate) | Look-alike names, leading to dispensing errors | Flomax vs. Fosamax |
| Risperdal (risperidone) - Requip (ropinirole) | Similar sounding names, risk of confusion | Risperdal vs. Requip |
| Lamictal - Lamisil | Similar names, risk of misreading | Lamictal vs. Lamisil |
| Celebrex - Celexa | Similar sounding names | Celebrex vs. Celexa |
| Zantac - Xanax | Pronunciation and spelling resemblance | Zantac vs. Xanax |
| Flomax - Fosamax | Look-alike names, leading to dispensing errors | Flomax vs. Fosamax |
| Risperdal - Requip | Similar sounding names, risk of confusion | Risperdal vs. Requip |
| Wellbutrin - BuSpar | The confusing similarity in names | Wellbutrin vs. BuSpar |
| Toprol - Tegretol | Look-alike names | Toprol vs. Tegretol |
| Klonopin - Clonidine | Similar spelling, potential misreading | Klonopin vs. Clonidine |
| Mellaril - Mellaril | Identical names, high risk of confusion | Mellaril (Thioridazine) vs. Mellaril (Sertindole) |
| Adderall - Ativan | Similar-sounding names, risk of misinterpretation | Adderall vs. Ativan |
| Concerta - Klonopin | Pronunciation similarity, risk of misreading | Concerta vs. Klonopin |

| | | |
|---|---|---|
| Benadryl - Benazepril | Similar spelling and pronunciation | Benadryl vs. Benazepril |
| Abilify - Atarax | Similar sounding names | Abilify vs. Atarax |
| Zoloft - Zocor | Similar spelling, risk of confusion | Zoloft vs. Zocor |
| Tramadol - Talwin | Similar sounding names | Tramadol vs. Talwin |
| Paxil - Prilosec | Similar sounding names, risk of confusion | Paxil vs. Prilosec |
| Nexium - Nizoral | The confusing similarity in names | Nexium vs. Nizoral |

**14. Overdosing with LASA Drugs (Look-Alike Sound-Alike)**

- **Risk of Overdosing**

Pharmacists highlight the risks associated with LASA drugs—medications with similar names that can lead to dosing errors and potential overdosing.

| Prevention Strategy | Description | Implementation Example |
|---|---|---|
| Clear Labelling | Importance of precise medication labels to avoid confusion | Improved labelling systems |
| Technology-Based Systems | Utilizing barcode scanning and computerized order entry systems | Incorporating electronic systems |

**15. Educational Approaches:**

Pharmacists focus on educating patients and healthcare professionals to prevent dosing errors related to LASA drugs. Clear communication and information significantly reduce risks associated with look-alike sound-alike medications.

The detailed elucidation of drug dosing, incompatibilities, and risks related to LASA drugs is vital for pharmacists in hospital settings. This knowledge is imperative for ensuring optimal medication outcomes and patient safety, thus forming an integral part of the Hospital Pharmacist Training Module.

This comprehensive explanation covers essential aspects of drug dosing, incompatibility, and the risks associated with LASA drugs, providing pharmacists with a thorough understanding of the intricacies involved in medication administration within a hospital setting.

## 16. OCCUPANCY RATES IN HEALTH FACILITIES

The occupancy rate is a calculation used to show the actual utilization of an inpatient health facility for a given time period. It is expressed as a percent and other terms which are often used synonymously include "percent occupancy," "percentage of occupancy," or "occupancy ratio." In the Bureau of Health Statistics, occupancy rates are routinely calculated for hospitals and nursing homes and aggregated at the facility, county and state level. This information is very useful for health planning purposes and is requested from the Bureau frequently.

To calculate the average occupancy rate for a typical one-year reporting period, two data items are needed. These include "Inpatient Days of Care" and "Bed Days Available." Definitions of these two items are as follows:

**Inpatient days of care**

Sum of each daily inpatient census for the year. To arrive at this total, you would simply add together each daily census for the 365 days in the year. Other synonymous terms include "total inpatient service days," "occupied bed days," or "census patient days of care."

**Beds days available**

The maximum number of inpatient days of care that would have been provided if all beds were filled during the year. If 50 beds were available for use each day during the year, bed days available would be 50 x 365 = 18,250. If the number of beds fluctuated throughout the year, bed days available should reflect this and the calculation would be more complicated. This will be discussed in more detail in the following paragraphs. Other terms used for bed days available include "potential days," "maximum patient days," or "total inpatient bed count days."

To calculate occupancy rate, use inpatient days of care and bed days available in this formula:

**(Inpatient Days of Care / Bed Days Available) x 100**

The calculation of occupancy rates is not limited to the facility as a whole. Occupancy rates are often calculated to determine the utilization of a specific inpatient unit such as obstetric, psychiatric, medical/surgical, etc.

**Conclusions**

Pharmacists need to understand the prescription and choose the right drugs before delivering them to the patient. Through meticulous double-checking, leveraging technology, patient counselling, and continual pharmacy education, pharmacists actively identify prescription errors. By ensuring accuracy in interpreting prescriptions, understanding medical abbreviations, and implementing robust error-prevention measures, pharmacists play a pivotal role in providing effective pharmaceutical care,

Comprehensive Understanding of Drug Dosing, Incompatibility, and LASA Drugs in Hospital Pharmacy Practice Understanding drug dosing, timing of meals, incompatibilities, and risks related to look-a-like sound-like (LASA) drugs is pivotal in pharmacy practice.

This section of the training module should incorporate practical exercises and hands-on training to allow pharmacists to apply these principles in a real-world pharmacy setting. Regular assessments and audits can also be used to evaluate and improve store management practices.

## MODULE -F

## Financial Stability: Handling Accounting Procedures for Long-Term Hospital Pharmacy Management

### 1. Accounting

Effective financial management is essential for a hospital pharmacy to ensure financial sustainability, compliance with regulations, and efficient operations. This section will focus on various aspects of accounting in a hospital pharmacy.

### 2. Financial Aspects of Hospital Pharmacy

Billing and Reimbursement: Train pharmacists on the process of billing, patients' insurance companies, government healthcare programs, etc. This includes understanding billing codes and procedures.

- **Insurance Claims**: Explain how to prepare and submit insurance claims for medication reimbursement, including private insurance, Medicaid, and Medicare.
- **Budget Management**: Introduce pharmacists to budget planning, including expense management and revenue generation. This may include developing an annual budget and tracking expenses against it.
- **Cost Control**: Discuss strategies to control costs, such as optimizing inventory management, minimizing waste, and maximizing the use of generic medications.

### 3. Record-keeping and Compliance with Financial Regulations

- **Documentation and Record-keeping**: Emphasize the importance of accurate and organized record-keeping for financial transactions, patient billing, and medication procurement.
- **Compliance with Healthcare Financial Regulations**: Train pharmacists on the specific financial regulations and compliance requirements in the healthcare industry. This includes regulations related to billing, coding, fraud prevention, and the Health Insurance Portability and Accountability Act (HIPAA).
- **Audit Preparedness**: Prepare pharmacists for financial audits, explaining the process and the types of documentation and records that auditors may request.

- **Reporting Requirements**: Ensure that pharmacists understand reporting obligations, both internal and external, and the importance of timeliness and accuracy in financial reporting.

**4. Technology and Financial Management Systems**

- **Use of Financial Software**: Introduce pharmacists to financial software and tools that can streamline billing, claims processing, and budget management.
- **Electronic Health Records (EHR)**: Discuss the integration of pharmacy operations with the hospital's EHR system, emphasizing the importance of accurate documentation for billing and financial record-keeping.

**5. Collaboration and Communication**

- **Interdepartmental Collaboration**: Insist on the importance of collaboration with other departments in the hospital, such as finance, to ensure proper financial management and compliance with regulations.
- **Patient Communication**: Train pharmacists in effective communication with patients regarding billing, insurance, and financial assistance programs. They should be prepared to address patients' financial concerns and provide appropriate guidance.

**6. Continuous Improvement programmes and Ethical Considerations**

- **Ethical Practices**: Highlight the importance of ethical financial practices, including perfect billing, honest reporting, and maintaining the confidentiality of patients.
- **Continual Monitoring and Improvement**: Encourage pharmacists to continually monitor financial processes and seek areas for improvement, efficiency, and cost savings.

This section should incorporate practical exercises, case studies, and simulations to help pharmacists apply accounting principles in a hospital pharmacy setting. Additionally, training on specific billing and insurance software used in the hospital should be included to ensure pharmacists are proficient in their usage.

## Chapter 7: The Vital Significance of Patient Counselling for Hospital Pharmacy Practice

### 1. Patient Counselling

Patient counselling is a critical aspect of a hospital pharmacist's role. It involves effective communication, educating patients about medication usage, and side effects, and ensuring adherence. This section emphasizes the importance of patient-centred care.

### 2. Effective Communication with Patients

- **Patient-Cantered Care**: Explain the concept of patient-centred care, where the patient's needs, values, and preferences are at the forefront of all interactions.
- **Active Listening**: Train pharmacists in active listening skills, ensuring they fully understand the patient's concerns and questions.
- **Cultural Competency**: Emphasize the importance of being culturally sensitive and adapting communication to meet the patient's cultural background and language needs.
- **Empathy**: Encourage pharmacists to show empathy and understanding, recognizing the emotional and psychological aspects of a patient's condition.

### 3. Medication Counselling

- **Medication Instructions**: Pharmacists should be able to provide clear and understandable medication instructions. This includes dosage, timing, route of administration, and any specific conditions (e.g., after food, before food, at night).
- **Side Effects**: Train pharmacists to educate patients about potential side effects, their likelihood, and what to do if they occur. Provide strategies for taking care of common side effects.
- **Adverse Reactions**: Discuss how to differentiate between expected side effects and adverse reactions that require immediate attention.
- **Contraindications**: Ensure pharmacists can communicate contraindications effectively and explain why a particular medication is not suitable for the patient.

### 4. Addressing Patient Concerns and Questions

- **Question Handling**: Train pharmacists on effective techniques for addressing patient questions, such as using plain language, visual aids, and analogies to enhance understanding.
- **Adherence Counselling**: Emphasize the importance of discussing medication adherence with patients. Provide strategies for improving adherence and addressing non-adherence issues.
- **Informed Decision-Making**: Encourage pharmacists to facilitate shared decision-making, where patients actively participate in making decisions about their treatment.
- **Managing Concerns**: Teach pharmacists how to address patient misconceptions, and concerns, and provide strategies to nullify these concerns.

**5. Counselling Scenarios and Role**

- **Role-Playing Exercises**: Engage pharmacists in role-playing scenarios where they interact with simulated patients to practice effective counselling techniques. These scenarios should cover various aspects of medication counselling.
- **Case Studies**: Present real-life case studies where effective counseling makes a significant difference in patient outcomes. Discuss the pharmacist's role in these cases.

**6. Cultural Sensitivity and Patient Diversity**

- **Diverse Patient Populations**: Address the importance of understanding and respecting the cultural and diversity factors that influence patient communication and healthcare decisions.
- **Health Literacy**: Train pharmacists to recognize and address issues related to health literacy, and provide strategies to improve patient understanding.

**7. Follow-up and Monitoring**

- **Patient Follow-up**: Stress the significance of periodic follow-up to assess patient progress, address ongoing concerns, and ensure medication adherence.
- **Medication Therapy Management (MTM)**: Discuss how pharmacists can provide medication therapy management services to optimize patient outcomes.

This section of the training module should focus on practical, patient-centered communication skills and strategies, using realistic scenarios and role-playing exercises to enhance pharmacists' ability to provide effective counselling and support patient needs. It should also emphasize the ongoing nature of patient counselling, as patient needs may evolve.

## MODULE -G

## Progress in Pharmaceuticals: Handling Novel Compounds and Medication Doses for Hospital Pharmacists

### 1. New Molecules Update

The pharmaceutical industry continually introduces new medications, offering innovative treatment options for various medical conditions. Pharmacists must stay updated on these new molecules to understand their indications usage and advantages over the existing drugs.

### 2. Importance of latest information

- **Enhanced Patient Care**: New molecules can provide more effective treatment options, fewer side effects, and improved patient outcomes. Staying updated ensures that pharmacists can recommend the latest and most suitable therapies.
- **Safety and Efficacy**: By understanding the indications and usage of new molecules, pharmacists can promote the safe and effective use of these medications.

### 3. Regular Updates on the latest Medications

- **Sources of Information**: Explain where pharmacists can access reliable and up-to-date information on new medications. This may include pharmaceutical journals, drug databases, pharmaceutical manufacturers' updates, and regulatory authorities' publications.
- **Continual Learning**: Encourage pharmacists to make continuous learning a part of their professional development. This includes attending seminars, webinars, and conferences that focus on new drug introductions.

### 4. Understanding the Role of New Molecules in Patient Care

- **Therapeutic Categories**: New molecules often fall into specific therapeutic categories. Pharmacists should be aware of these categories and the conditions they address.
- **Indications**: Train pharmacists to understand the indications for new molecules. Discuss the conditions or diseases they are approved to treatment with experts .

- **Mechanism of Action**: Explain the mechanisms by which new molecules act. This understanding is important for explaining their role in patient care.
- **Adverse Effects**: Provide information on potential side effects and adverse reactions associated with these new molecules. This will help pharmacists to counsel patients effectively.

**5. Clinical Application**

- **Case Studies**: Discuss case studies that showcase the application of new molecules in real patient scenarios. Highlight how these medications are useful to improve patient outcomes.

**6. Ongoing Learning and Adherence to Regulatory Requirements**

- **Regulatory Compliance**: Ensure pharmacists understand and adhere to the regulatory requirements concerning the introduction and use of new molecules, including safety reporting and documentation.
- **Continual Monitoring**: Stress the importance of continual monitoring for new information about these molecules, including updates on indications, dosing, and adverse effects.

**7. Drug Dosage information**

A solid understanding of drug dosages and administration techniques is a must for a hospital pharmacist. This section serves as a refresher on these essential aspects, with a specific focus on reviewing common dosages and calculations for dosing in special populations.

**8. Review of Common Drug Dosages and Administration Techniques**

- **Standard Dosages**: Provide a comprehensive review of standard dosages for commonly used medications in the hospital. This may include dosages for oral, intravenous, intramuscular, and subcutaneous administration.
- **Dosing Guidelines**: Discuss the guidelines for dose adjustments based on factors such as patient weight, age, renal function, and coexisting disease conditions.
- **Route of Administration**: Explain the various routes of drug administration, including oral, intravenous, intramuscular, subcutaneous, and transdermal, with a focus on best practices for each.

- **Injection Techniques**: Demonstrate proper techniques for parenteral administration of drugs. including aseptic procedures and safe practices for needle disposal.

**9. Calculations for Dosing in Special Populations**

- **Paediatric patients**: Teach pharmacists how to calculate appropriate drug dosages for paediatric patients based on age, weight, and body surface area. Discuss the use of paediatric-specific drug references and dosing recommendations.
- **Geriatric patients**: Highlight the considerations and potential dosage adjustments required for geriatric patients, including the impact of age-related changes in metabolism and renal function.
- **Renal disease patients**: Discuss how to adjust drug dosages in patients with impaired renal function. Explain the principles of creatinine clearance-based dosing and the use of drug dosing equations.
- **Weight-Based Dosing**: Emphasize the importance of dosing medications based on a patient's weight and provide examples of weight-based dosing calculations.
- **Body Surface Area (BSA) Calculations**: Explain the significance of BSA in determining drug dosages for certain medications, especially in oncology and paediatrics.

**10. Practical Exercises and Case Studies**

- **Dose Calculations**: Engage pharmacists in practical exercises and case studies that require them to calculate dosages for various medications. These exercises should cover both standard dosages and dosing in special populations.

**11. Patient Safety and Medication Errors**

- **Patient Safety**: Explain the importance of accurate dosage calculations in ensuring patient safety and minimizing medication errors.
- **Error Prevention**: Discuss strategies to prevent medication dosing errors, including double-checking calculations, using available dosing tools, and involving a second healthcare professional in high-risk situations.
- **Reporting and Documentation**: Stress the importance of reporting and documenting any medication dosing errors by hospital policies and regulatory requirements.

This section should combine theoretical knowledge with practical exercises to ensure that pharmacists are not only knowledgeable but also proficient in calculating and administering drug dosages accurately.

**5. Practical Exercises and Drills**

- **Emergency master plan**: Conduct simulated emergency master plans and drills to allow pharmacists to practice their first aid skills and the implementation of emergency response protocols.

**6. Reporting and Documentation**

- **Incident Reporting**: Highlight the importance of reporting all first aid interventions and incidents by hospital policies and regulatory requirements.
- **Documentation:** Train pharmacists must documentation of any first aid provided. This may include patient records, incident reports, and communication logs.

**7. Psychological support**

- **Psychological Support**: Stress the importance of offering psychological support to patients and families in distress during and after emergencies.
- **Interrogate**: Educate pharmacists on the benefits of debriefing sessions to process emotions and reactions following a critical incident.

**8. Protocols Issued by the Government for Different Diseases**

Pharmacists play a crucial role in implementing government guidelines and protocols for disease management. This section emphasizes the importance of understanding and implementing these protocols and staying informed about disease outbreaks and required responses.

**9. Understanding Government Guidelines and Protocols**

- **Role of Government Agencies**: Explain the role of government agencies, such as the Centres for Disease Control and Prevention (CDC) or the World Health Organization (WHO), in issuing guidelines and protocols for disease management.
- **Public Health Impact**: Emphasize the impact that government guidelines have on public health, including disease prevention, control, and treatment.

**10. Implementation of Disease Management Protocols**

- **Infection Control Practices**: Train pharmacists on infection control practices, including hand hygiene, personal protective equipment (PPE) usage, and safe handling of potentially contaminated materials.
- **Medication Dispensing Protocols**: Provide an overview of government-approved medications for specific diseases and explain the protocols for dispensing and monitoring these medications.
- **Patient Education**: Train pharmacists to effectively educate patients on disease prevention, management, and adherence to prescribed treatments.
- **Reporting Obligations**: Explain the legal and ethical obligations of pharmacists to report certain diseases or conditions to public health authorities, as required by government protocols.

**11. Staying Informed About Disease Outbreaks and Responses**

- **Sources of Information**: Encourage pharmacists to regularly monitor government sources of information, such as official websites, newsletters, and notifications, for updates on disease outbreaks and responses.
- **Emergency Response Plans**: Discuss the importance of having emergency response plans in place to quickly adapt to new disease outbreaks and provide an effective response within the hospital setting.
- **Continual Learning**: Stress the importance of continuous learning and staying informed about evolving disease management strategies and emerging infectious diseases.

**12. Case Studies and master plan**

- **Real-life master plan**: Present case studies and scenarios that require pharmacists to apply government protocols in response to disease outbreaks. Encourage discussion and analysis of the best course of action.

## 13. Interdisciplinary participation

### 13.1 Healthcare Team Participation:

- Highlight the importance of participation with other healthcare professionals, such as physicians, nurses, and infection control specialists, in implementing government protocols effectively. Interdisciplinary collaboration is essential for the effective implementation of government protocols for disease outbreaks. Pharmacists must be able to work closely with other healthcare professionals, such as physicians, nurses, and infection control specialists, to ensure that patients receive the best possible care.

### 13.2 Communication:

- Discuss the significance of clear and effective communication in ensuring a coordinated response to disease outbreaks within the hospital. Clear and efficient communication is also essential for ensuring a coordinated response to disease outbreaks within the hospital. Pharmacists must be able to communicate effectively with other healthcare professionals, as well as with patients and their families.
- By communicating effectively, pharmacists can help to ensure that everyone involved in the patient's care is on the same platform and that the patient receives the best possible care.
- Here are some specific examples of how pharmacists can collaborate with other healthcare professionals and communicate effectively to ensure a coordinated response to disease outbreaks within the hospital:
- Work with nurses to educate patients on how to manage their medications and prevent the spread of infection. Pharmacists can provide educational materials and answer patients' questions.
- Collaborate with infection control specialists to develop and implement infection prevention and control measures. Pharmacists can help to develop policies and procedures, train staff, and monitor compliance.
- Communicate with other healthcare professionals about the latest government protocols for disease outbreaks. Pharmacists can stay up-to-date on the latest protocols and share information with their colleagues.

- Communicate with patients about their medications and how to manage their symptoms. Pharmacists can provide clear and concise instructions and answer patients' questions.
- Communicate with patients' families about the patient's condition and how to support them. Pharmacists can provide information and support to patients' families during a difficult time.
- By collaborating with other healthcare professionals and communicating effectively, pharmacists can play a vital role in ensuring a coordinated response to disease outbreaks within the hospital.

**14. Ethical and Legal Considerations**

- **Ethical Obligations**: Emphasize that adhering to government protocols is an ethical obligation to protect public health and patient safety. Adhering to government protocols for disease outbreaks is an ethical obligation to protect public health and patient safety. Pharmacists must do everything they can to prevent the spread of disease and to ensure that their patients receive the best possible care. Government protocols are developed by experts in public health and infectious diseases. They are based on the latest scientific evidence and are designed to protect the public from harm. By adhering to government protocols, pharmacists can help to reduce the risk of disease outbreaks and improve patient outcomes. pharmacists have a duty to their patients to provide them with safe and effective care. This includes following government protocols for disease outbreaks. By following these protocols, pharmacists can help to ensure that their patients receive the best possible care and that they are protected from the risk of infection.
- **Legal Obligations**: Pharmacists also have legal obligations to adhere to government protocols for disease outbreaks. In many jurisdictions, some laws require pharmacists to report cases of infectious disease to public health authorities. Some laws require pharmacists to follow specific protocols for dispensing medications to patients with infectious diseases. Failure to adhere to government protocols can have serious legal consequences. Pharmacists may be subject to fines, disciplinary action, or even criminal charges. In addition, pharmacists who fail to adhere to government protocols may be liable for damages if their patients are harmed. For example, a pharmacist who

dispenses medication to a patient with an infectious disease without following proper protocols could be held liable if that patient spreads the infection to others.

Overall, pharmacists have both ethical and legal obligations to adhere to government protocols for disease outbreaks. By following the protocols, pharmacists can help to protect public health and patient safety.

**9. Storage of Drugs**

Proper storage of medications is crucial to maintain their efficacy and safety. This section emphasizes the importance of safe and appropriate drug storage practices in a hospital setting.

**10. Importance of Proper Drug Storage**

- **Medication Efficacy**: Explain that proper storage conditions are vital to ensure that medications retain their intended therapeutic effects.
- **Patient Safety**: Emphasize that incorrect storage can compromise patient safety by potentially causing medication degradation or contamination.

**11. Factors Affecting Drug Storage**

- **Temperature Requirements**: Discuss the impact of temperature on medication stability and the specific temperature ranges required for different drugs.
- **Humidity Control**: Explain the significance of humidity control, especially for medications that are sensitive to moisture.
- **Light Sensitivity**: Address the potential for medications to degrade when exposed to light and the importance of light-protective packaging.

**12. Safe and Appropriate Medication Storage Practices**

Apart from vaccines, proper storage of medicines, including prescription drugs and over-the-counter products, is vital for maintaining their efficacy and safety:

- **Shelving and Storage Units**: Train pharmacists on proper shelving and storage unit selection, organization, and labelling to prevent errors and ensure easy access to medications.

- **Storage Containers**: Discuss the use of appropriate containers for medication storage, including vials, blister packs, and amber containers for light-sensitive drugs.
- **Security Measures**: Explain the importance of secure storage to prevent theft or unauthorized access to medications, particularly controlled substances.

Here are the general storage conditions for various types of vaccines:

- **Refrigerated Vaccines**: Most Common Vaccines like MMR (Measles, Mumps, Rubella), Varicella (Chickenpox), and Rotavirus vaccines typically require storage between 2°C to 8°C (36°F to 46°F). They should be stored in refrigerators with a consistent temperature monitoring system and should never be frozen.
- **Inactivated Vaccines:** Vaccines such as those for Hepatitis A, Influenza, and Injectable Polio fall under this category and require refrigeration to maintain potency.
- **Frozen Vaccines:** Some vaccines, like the Varicella vaccine component of the MMRV vaccine, require freezing at temperatures below -15°C (5°F).

Storage of frozen vaccines should occur in specialized freezers designated solely for vaccine storage and should avoid any thawing or refreezing cycles.

**12.1 Vaccines with Different Storage Requirements:**

- **Some exceptions:** The storage conditions can vary even among vaccines of the same type. For instance, different brands of the same vaccine might have specific storage guidelines. Vaccines containing adjuvants or those that are heat-sensitive may require particular attention to temperature control.

**13. Temperature Monitoring and Control**

- **Temperature Monitoring Equipment**: Teach pharmacists how to use temperature monitoring devices, such as data loggers and alarms, to track temperature conditions in storage areas.
- **Refrigerated Storage**: Explain the specific requirements for refrigerated storage, including temperature ranges and the segregation of refrigerated medications.
- **Climate Control**: Discuss the importance of maintaining climate control in storage areas to regulate temperature and humidity.

**14. Drug Specific requirement**

- **Special Drug Requirements**: Provide information on drugs with unique storage requirements, such as vaccines, biologics, and controlled substances.
- **Storage Duration**: Explain the shelf life and expiry dates of medications and the importance of rotation and removal of expired products.

**15. Handling Medication Recalls and Disposal**

- **Recall Procedures**: Train pharmacists on how to handle medication recalls, including identification, quarantine, and communication with relevant authorities.
- **Medication Disposal**: Discuss proper disposal procedures for expired, recalled, or damaged medications, ensuring compliance with environmental regulations.

**16. Regulatory Compliance**

- **Pharmacy Regulations**: Ensure pharmacists understand and adhere to relevant pharmacy regulations related to medication storage and security.
- **Documentation**: Stress the importance of accurate and detailed documentation regarding medication storage, including temperature logs and records of medication movement.

**17. Disaster Preparedness**

- **Emergency Planning**: Discuss the importance of having a disaster preparedness plan for safeguarding medications in the event of natural disasters or other emergencies.

## MODULE -H

### Pharmacy Development: Ongoing Education and Accuracy in Prescription Procedures

**1. Upgradation of pharmacy practice**

Pharmacy practices are constantly evolving, and pharmacists must engage in continual improvement to provide the best patient care. This section focuses on fostering a culture of learning, and adaptability, and seeking further education and training opportunities.

**2. The Importance of Upgradation**

- **Patient Outcomes**: Emphasize that upgradation is directly linked to improved patient outcomes and safety, as well as better clinical and pharmaceutical practices.
- **Professional Growth**: Explain that continual learning is essential for professional growth, career advancement, and job satisfaction.

**3. Further Education and Training**

- **Continuing Pharmacy Education (CME)**: Highlight the value of participating in CME programs, workshops, and courses to stay updated on the latest developments in pharmacy and healthcare.
- **Advanced Degrees and Certifications**: Encourage pharmacists to consider pursuing advanced degrees or certifications in specialized areas, such as pharmacotherapy, clinical pharmacy, Pharmacovigilance, healthcare management, etc.
- **Mentorship and Preceptorship**: Promote mentorship programs where experienced pharmacists can guide and support those seeking further education and training.

**4. Industry Trends and advancement**

- **Pharmaceutical Advancements**: Discuss the importance of staying informed about the latest advancements in pharmaceuticals, including new drug approvals and therapies.
- **Healthcare Innovations**: Encourage pharmacists to explore healthcare innovations and technologies that can enhance patient care, such as telehealth and medication management systems.

**5. Adapting to Regulatory compliances**

- **Regulatory Compliance**: Explain that pharmacists must stay updated on changes in pharmacy regulations, ensuring compliance with new standards and requirements.
- **Ethical Considerations**: Discuss the ethical obligations of pharmacists, including upholding patient confidentiality and informed consent.

**6. Quality control Improvement Initiatives**

- **Continuous Quality Improvement (CQI)**: Train pharmacists to engage in CQI initiatives within the pharmacy practice, focusing on improving processes, patient outcomes, and safety.
- **Patient Feedback**: Encourage pharmacists to seek and act on patient feedback to enhance the patient experience.

**7. Professional Development Plans**

- **Individual Development**: Encourage each pharmacist to create a personal professional development plan that outlines goals, timelines, and strategies for upgradation.
- **Goal platform**: Stress the importance of setting clear and measurable goals for professional growth and development.

**8. Cultural Shift Towards Upgradation**

- **Pharmacy Culture**: Foster a culture within the pharmacy practice that values upgradation and sees it as a shared responsibility.
- **Recognition and Rewards**: Consider implementing recognition and reward systems to celebrate achievements and contributions to upgrade efforts.

**9. Supporting Work-Life Balance**

- **Balancing Work and Education**: Highlight the importance of maintaining a healthy work-life balance while pursuing further education and training.
- **Time Management**: Provide strategies for efficient time management to accommodate additional learning efforts.

**10. Measuring Progress and Impact**

- **Assessment and Evaluation**: Regularly assess the impact of upgrade efforts on patient care, safety, and pharmacy practices.
- **Feedback and Adjustments**: Use feedback from pharmacists and patients to make adjustments and improvements in the upgrade process.

**11. Prescriptions and critical evaluation**

A prescription is an important communication tool between healthcare providers and pharmacists, outlining the specific medications and instructions for a patient's treatment. In this segment, we delve into the fundamental aspects of comprehending prescriptions, encompassing the components, interpretation, common abbreviations, potential errors, and safety measures associated with prescriptions.

**11.1 Components of a Prescription**

- A prescription typically comprises several key elements essential for accurate dispensing and administration of medications. The components include:
- Patient Information: Name, age, sex, and other specific identifiers of the patient.
- Date of Prescription: The date when the prescription was written.
- Prescriber Information: Name, credentials, contact details, and signature registration number
- Drug Name and Dosage: Specific names of prescribed medications and their respective dosages. If Possible generic names along with brand names
- Route of Administration: Instructions on how the medication should be taken, such as orally, topically, intravenously, etc.
- Frequency and Duration: The frequency and duration for which the medication should be taken.
- Special Instructions: Any additional notes or precautions.

**11.2 Prescription content verifications**

Interpreting prescriptions accurately is a fundamental responsibility of a pharmacist. Understanding medical terminologies, abbreviations, and dosage instructions is imperative to ensure patient safety and adherence to the prescriber's intentions.

This involves:

- Decoding Drug Names: Recognizing brand and generic names, as well as understanding the right drugs for the right disease.
- Dosage Decoding: Interpreting the strength and dosage form of the medication.
- Route of Administration: Determining the intended method of administering the medication.
- Frequency and Duration: Comprehending the prescribed schedule and the duration of the treatment.
- Interpreting prescriptions with precision is a pivotal aspect of a pharmacist's role. It involves several key elements essential for ensuring the safe and effective dispensing of medications.

## MODULE -I

## REGULATORY BODIES

### 1. Pharmacy Act, 1948

Pharmacy Council of India (PCI) and State Pharmacy Councils to oversee the education, practice, and registration of pharmacists.

The Pharmacy Act, of 1948 is a legal body in India that governs the practice of pharmacy and regulates the profession to ensure the quality, safety, and efficacy of pharmaceutical services. It establishes a framework for the education, practice, and registration of pharmacists across the country.

- **Regulation of Pharmacy Profession**

The primary objective of the Pharmacy Act is to regulate the pharmacy profession to safeguard public health. It outlines the requirements and standards for the practice of pharmacy, ensuring that individuals engaged in the profession possess the necessary qualifications, skills, and ethical standards.

### 2. Pharmacy Council of India (PCI) and State Pharmacy Councils

#### 2.1 Pharmacy Council of India (PCI)

- PCI is a statutory body constituted under the Pharmacy Act, of 1948.
- Its primary role is to regulate the education and practice of pharmacy in India.
- PCI sets and maintains standards for pharmacy education, curriculum, and qualifications for pharmacists.

#### 2.2 State Pharmacy Councils

- Each state has its own Pharmacy Council established under the Pharmacy Act.
- State Pharmacy Councils regulate the pharmacy profession at the state level and ensure compliance with national standards.

#### 2.3 Functions of PCI and State Pharmacy Councils

- **Education Regulation:** Approval and accreditation of pharmacy institutions and courses. Setting standards for pharmacy education and syllabi.

- **Registration and Licensing:** Registration of pharmacists and pharmacy technicians. Enforcing codes of conduct and ethics for the pharmacy profession.
- **Practice Oversight**

Monitoring and ensuring compliance with pharmacy laws and standards. Regulating pharmaceutical practice to maintain public safety and health. The Pharmacy Act, of 1948 and the bodies established under it play a vital role in standardizing the pharmacy profession. They ensure that pharmacists possess the necessary qualifications, skills, and ethical values required to deliver quality pharmaceutical services. The Act and its associated councils uphold the accountability and responsibility of pharmacists in providing safe and effective healthcare services to the public.

Compliance with the Pharmacy Act is essential for every individual involved in the pharmacy profession, including pharmacists, educators, and institutions offering pharmacy education. Adhering to the standards set by the Pharmacy Act and the Pharmacy Council of India is vital in maintaining the integrity and quality of the pharmacy profession in India.

**3. Drugs and Cosmetics Act, 1940**

- Governs the import, manufacture, distribution, and sale of drugs and cosmetics.
- Ensures quality, safety, and efficacy of pharmaceutical products.

**3.1 Pharmaceutical Care and Recent Amendments in the Drug and Cosmetic Act**

- **3.1.1 Pharmaceutical Care Principles**

Pharmaceutical care represents a patient-centered approach to pharmacy practice, emphasizing the pharmacist's role in ensuring optimal medication therapy outcomes.

- **3.1.2 Patient-Cantered Pharmaceutical Care**

This approach places the patient at the core of decision-making regarding their medication therapy. It involves:

**A. Comprehensive Medication Review**

Assessing the patient's medication history, including prescription drugs, over-the-counter medications, and supplements.

Identifying potential drug interactions, duplications, or adverse effects.

**B. Individualized Care Plans**

Tailoring medication regimens to suit the patient's specific needs, considering their medical condition, lifestyle, and preferences.

Collaborating with healthcare teams to optimize treatment outcomes.

**C. Monitoring and Follow-up**

Continuously assessing the patient's response to medication therapy.

Addressing any concerns, evaluating effectiveness, and ensuring adherence.

**D. Ensuring Medication Adherence and Counselling**

Implementing strategies to enhance adherence and overcome barriers to compliance.

**E. Counselling and Patient Education**

Providing comprehensive information to patients about their medications, empowering them to make informed decisions.

Encouraging open communication, addressing concerns, and promoting a partnership in managing their health.

### 3.2 Recent Amendments in the Drug and Cosmetic Act

- **Understanding Updates in Legislation Impacting Pharmacy Practice**

Recent amendments in the Drug and Cosmetic Act aim to adapt to evolving healthcare needs, technological advancements, and changing market dynamics. These amendments may involve:

- **Stringent Quality Control Measures**

Strengthening regulations to ensure the safety, efficacy, and quality of pharmaceutical products.

Strictly Implementing quality control standards throughout the manufacturing and distribution processes.

- **Enhanced Drug Approval Processes:**

Streamlining and expediting the drug approval process while maintaining rigorous scrutiny to expedite the availability of essential medications in the market.

- **Incorporation of Technological Advancements:**

Integrating technology for electronic records, prescriptions, and pharmacovigilance to enhance traceability and efficiency in healthcare delivery.

Compliance and Implications for Pharmacists.

- **Adherence to Regulatory updates:**

Pharmacists need to stay updated with amendments, ensuring compliance with new guidelines and standards set by the updated legislation.

- **Impact on Practice and Patient Care:**

Understanding the implications of amendments on pharmacy practice, including alterations in dispensing procedures, documentation, or reporting requirements.

Adapting practice methodologies to align with updated legal obligations, maintaining quality patient care, and medication safety.

- **Professional Development and Adaptation**

Pharmacists may need additional training or educational updates to comply with the amended laws.

The need to adapt and align their practices with the evolving legal obligations to maintain the quality of patient care.

Understanding and adhering to these amendments in the Drug and Cosmetic Act is crucial for pharmacists to ensure the continued provision of high-quality pharmaceutical services while complying with the revised legal framework. Staying informed and adaptable to changes in legislation is fundamental for pharmacists to fulfil their responsibilities effectively, safeguard patient safety, and maintain the integrity of pharmacy practice.

**4. The Drugs and Cosmetics Rules, 1945:**

- Provides detailed regulations related to drug manufacturing, sale, distribution, and labelling requirements.
- Specifies the conditions and standards for drug licensing.

**5. National Pharmaceutical Pricing Authority (NPPA):**

Regulates the prices of pharmaceutical drugs in India to ensure affordability and accessibility.

**6. Food Safety and Standards Authority of India (FSSAI):**

Regulates food safety, including food products that have medicinal or nutraceutical properties.

**7. National Accreditation Board for Hospitals & Healthcare Providers (NABH)**:

Sets standards and accredits healthcare institutions including hospital pharmacies to ensure quality and patient safety.

**8. Central Drugs Standard Control Organization (CDSCO):**

Regulates drug standards, clinical trials, import, manufacture, sale, and distribution of drugs in India.

**9. Narcotic Drugs and Psychotropic Substances Act, 1985:**

Regulates the manufacture, sale, transport, possession, and use of narcotic drugs and psychotropic substances.

**10. The Poisons Act, 1919:**

Regulates the import, possession, sale, and use of poisonous substances.

**11. Consumer Protection Act, 2019:**

- Protects the rights of consumers, including those about pharmaceutical products, services, and healthcare.
- These laws and regulatory bodies work in conjunction to ensure the safety, efficacy, and quality of pharmaceutical products and services provided in community and hospital pharmacies in India. They outline standards for drug manufacturing, sales,

licensing, and the conduct of healthcare professionals to protect public health and promote quality healthcare services. Understanding and adhering to these regulations is crucial for pharmacists and healthcare institutions to provide safe and effective patient care.

## MODULE -J

## Pharmacovigilance: Comprehending and Preventing Adverse Drug Reactions

### 1. Pharmacovigilance Adverse Drug Reaction

- Pharmacovigilance is defined as the science of detection, assessment, and prevention of adverse effects of medicines.
- Pharmacovigilance starts from the clinical trial stage and continues throughout the life cycle of the drug.
- The process of collection of safety information about a drug begins in phase one of the clinical trial and continues after approval.

**Introduction**

- Clinical trials (pre-determined inclusion–exclusion criteria).
- Approval: new drug application (NDA)
- Physicians prescribe it to the general population
- In such a scenario there may be adverse events that may be undetected in the pre-approval pharmacovigilance (clinical trial reports) but may show up in the post-authorisation safety studies
- Post-marketing studies may be mandatory and may be required to be: carried out as per policies of the national drug regulatory authority.
- Spontaneous reports of adverse events also contribute to the post-approval pharmacovigilance.

Pharmacovigilance plays a crucial role in ensuring medication safety by systematically monitoring, assessing, and preventing adverse drug reactions (ADRs). An ADR is any unwanted or harmful reaction experienced after administering a medication, be it prescription, over-the-counter, or herbal remedy.

Key components of pharmacovigilance encompass the collection, analysis, and evaluation of data related to ADRs. This involves vigilant reporting and monitoring by healthcare professionals, patients, and pharmaceutical companies. Robust systems are in place to detect,

assess, and understand these reactions, considering factors like patient characteristics, dosage, and potential interactions with other medications.

Understanding ADRs aids in enhancing patient safety and optimizing healthcare outcomes. It helps in:

- **Early Detection**: Recognizing and reporting ADRs promptly, thereby mitigating potential risks associated with certain medications.
- **Assessment and Analysis**: Thoroughly evaluating ADRs to comprehend their nature, severity, and potential impact on patient health.
- **Regulatory Compliance**: Adhering to regulatory requirements for reporting ADRs, ensuring medication safety standards are upheld.
- **Risk Management**: Developing strategies to manage identified risks associated with specific medications, which may include revising labeling or dosage recommendations.
- **Continuous Monitoring**: Continuously monitoring drugs even after approval to identify rare or long-term adverse effects that may not have been evident during initial clinical trials.
- **Public Health Improvement**: Contributing to a broader understanding of medication safety, leading to improvements in public health policies and practices.

Pharmacovigilance is an ongoing, collaborative effort involving healthcare professionals, regulatory agencies, pharmaceutical companies, and patients. It is an indispensable part of ensuring that medications provide benefits while minimizing risks, thereby promoting patient well-being and safety.

**2. Need for Pharmacovigilance:** Pharmacovigilance, or drug safety surveillance, is critical for several reasons:

- **Patient Safety**: The foremost reason is to ensure the safety of patients who use medications. Monitoring adverse drug reactions (ADRs) helps identify and prevent harm, improving patient outcomes.
- **Identifying New Risks**: Some adverse effects might not surface during clinical trials due to various factors like limited sample size or specific patient groups excluded from trials. Pharmacovigilance helps in detecting previously unknown or rare side effects.

- **Regulatory Compliance**: Regulatory bodies mandate pharmacovigilance activities to ensure compliance with safety standards. Reporting ADRs is often a regulatory requirement for pharmaceutical companies to maintain product approval.
- **Public Health Protection**: By identifying and analyzing ADRs, pharmacovigilance contributes to public health policies, enabling the withdrawal or modification of drugs that pose significant risks.
- **Improving Drug Labelling**: Data collected through pharmacovigilance assists in updating drug labels to reflect the latest safety information. This informs healthcare providers and patients about potential risks and how to manage them.
- **Risk-Benefit Assessment**: Pharmacovigilance provides crucial data to assess the balance between a drug's benefits and risks, aiding healthcare providers in making informed decisions.
- **Quality of Life Enhancement**: Timely identification and management of ADRs lead to improved patient compliance and quality of life, as it reduces the chances of experiencing adverse effects or complications.

**3. Pharmacovigilance activities**

Pharmacovigilance activities encompass a range of systematic processes and tasks aimed at monitoring, assessing, and managing the safety of medicines. Some key pharmacovigilance activities include:

- **Adverse Event Reporting**: Collecting information on suspected adverse drug reactions (ADRs) from various sources such as healthcare professionals, patients, and clinical trials. This includes gathering details about the nature and severity of the reactions.
- **Case Processing**: Evaluating and processing the reported adverse events, which involves documentation, coding, and assessment of causality (the relationship between the drug and the adverse event).
- **Signal Detection**: Identifying potential safety concerns or emerging issues related to a particular drug by analyzing aggregated data from various sources. This helps in detecting patterns or signals that might indicate previously unrecognized risks.
- **Risk Assessment and Analysis**: Conducting in-depth analysis of reported adverse events to understand the nature, frequency, and severity of risks associated with a medication. This involves evaluating the benefit-risk profile of drugs.

- **Risk Management**: Developing strategies to minimize or manage identified risks, which may include updating product labels, issuing warnings, implementing risk minimization measures, or, in extreme cases, withdrawing the drug from the market.
- **Periodic Safety Update Reports (PSURs)**: Preparing and submitting periodic safety reports to regulatory authorities summarizing the safety profile of a drug based on ongoing surveillance and analysis.
- **Post-Marketing Surveillance Studies**: Conducting additional studies or trials post-approval to further evaluate the safety profile of a drug in real-world settings, especially for long-term effects or in specific populations.
- **Communication and Dissemination of Safety Information**: Sharing safety information and updates with healthcare professionals, regulatory agencies, and the public to ensure informed decision-making regarding medication use.
- **Collaboration and Networking**: Engaging in collaborations and partnerships with other stakeholders, including healthcare providers, pharmaceutical companies, regulatory agencies, and research organizations, to enhance pharmacovigilance efforts globally.

These activities collectively aim to ensure the ongoing evaluation and management of medication safety throughout the drug lifecycle, from pre-market approval to post-market surveillance, to protect patient health and optimize healthcare outcomes.

**4. Adverse Drug Reactions (ADR) and Pharmacovigilance**

Adverse Drug Reactions (ADRs) refer to unintended and harmful reactions to medications that occur at doses commonly used for prophylaxis, diagnosis, or therapy. Pharmacovigilance, on the other hand, involves the monitoring, detection, assessment, understanding, and prevention of adverse effects or any other drug-related problems.

- **Types and Classifications of ADRs**

**4.1 Type A Reactions (Augmented):**

- Predictable reactions due to the pharmacological action of the drug.
- Examples include nausea, dizziness, and allergic reactions.

**4.2 Type B Reactions (Bizarre):**

- Unpredictable reactions not related to the drug's known pharmacological action.
- Examples include severe allergic reactions like anaphylaxis or idiosyncratic responses.

**4.3 Type C Reactions (Chronic):**

- Dose-dependent reactions that occur after prolonged use.
- Examples include medication-induced organ damage or toxicity over time.

**4.4 Type D Reactions (Delayed):**

- Reactions that manifest after a significant period post-drug administration.
- Examples include late-onset allergies or carcinogenic effects.

**4.5 Type E Reactions (End-of-Use):**

- Reactions occurring after discontinuing the drug's use.
- Examples include withdrawal symptoms or rebound effects.
- Importance of ADR Monitoring in Patient Safety.

**4.6 Type F reactions (Failure of therapy):**

- These reactions are related to the failure of a drug to produce the expected therapeutic effect.
- It can be due to various reasons such as drug interactions, inadequate dosage, or individual variations in drug response.

**4.7 Identification of Unforeseen Reactions**:

- ADR monitoring helps in detecting unexpected or rare adverse effects that were not evident during clinical trials.
- It aids in expanding the understanding of a drug's safety profile beyond its initial approval.

**13. Collection of Data for ADR Detection**:

- **Sources of Data**: Clinical trials, spontaneous reporting systems, patient self-reporting, and healthcare professional reporting.

- **Methods**: Electronic health records, pharmacovigilance databases, adverse event reporting forms.

**13. Prevention of Adverse Effects of Drugs**:

- **Pharmacogenomics**: Tailoring drug therapy based on an individual's genetic makeup.
- **Proper Prescribing**: Adequate dosing, careful consideration of patient history, and potential drug interactions.
- **Patient Education**: Informing patients about potential side effects and the importance of reporting adverse reactions.

**14. Documentation of adverse drug reactions (ADRs)**

Documentation of ADRs is essential for maintaining comprehensive medical records and ensuring patient safety. Proper documentation helps in monitoring, analyzing, and reporting adverse events associated with medications. Here's how ADRs are typically documented:

**14.1. Medical Electronic Records**:

- **Patient History**: Detailed patient history should include previous adverse reactions to medications, allergies, and intolerances.
- **Medication List**: Accurate records of current and past medications, including prescription drugs, over-the-counter medications, supplements, and herbal remedies.
- **Adverse Event Recording**: Document any reported adverse events during a patient encounter, including symptoms, their onset, duration, severity, and the suspected medication involved.

**14.2. Adverse Event Reporting Forms:**

- **Spontaneous Reporting Systems**: Healthcare professionals, pharmacists, and patients can use specific forms or online systems to report ADRs to regulatory authorities or pharmaceutical companies.
- **Pharmacovigilance Databases:** ADRs reported by healthcare providers are entered into pharmacovigilance databases for further analysis and monitoring.

**14.3. Electronic Health Records (EHRs):**

- **Structured Data Entry:** EHR systems often have fields to record allergies, intolerances, and adverse reactions, ensuring standardized documentation.
- **Alert Systems**: Integration of alert systems that warn healthcare providers about potential drug interactions or allergies based on documented ADRs.

**14.4. Adverse Event Monitoring**:

- **Periodic Safety Update Reports (PSURs):** Compile and submit periodic safety reports to regulatory authorities, summarizing adverse events associated with specific medications.
- **Signal Detection**: Analyse aggregated data from various sources to detect patterns or signals indicating potential new ADRs.

**14.5. Research and Clinical Trials:**

- **Clinical Trial Documentation**: Monitoring and documenting adverse events during clinical trials to assess the safety profile of investigational drugs.
- **Research Studies**: Documenting adverse events occurring in real-world settings to evaluate the safety and efficacy of medications post-approval.

**14.6. Patient Involvement:**

- **Patient Reporting:** Encouraging patients to report any suspected adverse reactions they experience, facilitating patient engagement in ADR documentation.
- **Patient Education**: Educating patients about the potential side effects of medications and the importance of reporting any unusual symptoms to their healthcare provider.
- **Importance of Adequate Documentation**: Facilitates accurate assessment and analysis of ADRs. Enables healthcare providers to make informed decisions about medication management. Supports pharmacovigilance efforts by providing crucial data for risk assessment and regulatory reporting. Helps in identifying and preventing future occurrences of similar adverse events. A systematic and comprehensive approach to documenting adverse drug reactions is crucial for improving patient safety, facilitating regulatory compliance, and advancing pharmacovigilance efforts.

**14.7 Enhancing Patient Care and Safety:**

- Early identification of ADRs allows healthcare professionals to promptly intervene and prevent further harm to patients.
- Timely recognition can lead to appropriate adjustments in treatment plans, dosage alterations, or discontinuation of the offending drug.

**14.8. Contributing to Pharmacovigilance**:

- ADR monitoring feeds into pharmacovigilance databases, enabling the identification of potential safety signals in medications.
- It aids regulatory bodies in assessing and reassessing the risk-benefit profile of drugs in the market.

**15. Public Health Impact**:

- Monitoring ADRs on a larger scale assist in understanding population-level risks associated with medications.
- It helps in formulating guidelines for safer drug use and prescribing practices.
- Improving Drug Development and Regulatory Decisions:
- Data gathered from ADR monitoring contributes to refining drug development strategies and making informed regulatory decisions.
- It influences labeling requirements, contraindications, and warnings associated with medications.

**16. Pharmacovigilance reporting**

- Role of pharmacists in pharmacovigilance
- Reporting and documentation of ADRs
- Contributing to drug safety through vigilance

**17. Patient-centred pharmaceutical care**

Patient-centered pharmaceutical care is a pivotal approach that places the patient at the forefront of pharmacy practice. It's a holistic method that focuses on optimizing patient

outcomes through personalized medication management and fostering a strong pharmacist-patient relationship.

**18. Personalized Medication Management**

Individualized Treatment Plans and custom-made medication regimens to meet the unique needs, preferences, and health goals of each patient.

- **Comprehensive Medication Reviews:** Assessing the patient's complete medication profile to identify potential interactions, duplications, and adverse effects.

**18.1. Collaborative Patient-Provider Relationship**

- **Open Communication**: Encouraging dialogue between the pharmacist and patient to ensure a clear understanding of medication usage, potential side effects, and adherence strategies.
- **Shared Decision-Making**: Involving patients in decisions about their treatment plans, considering their values and preferences.

**18.2. Education and Empowerment**

- **Medication Counselling**: Providing detailed information about prescribed medications, including dosage, administration instructions, and potential side effects.
- **Health Literacy**: Empowering patients with knowledge to make informed decisions about their health, treatment options, and adherence strategies.

**18.3. Continual Monitoring and Follow-up of treatment**

- **Assessment of Treatment Outcomes**: Regularly evaluating the effectiveness of medications and adjusting treatment plans as needed.
- **Follow-up Care**: Engaging in ongoing follow-up to address any concerns, assess adherence, and ensure optimal medication efficacy.

**18.4. Holistic Approach to Patient Wellness**

- **Consideration of Whole Health**: Recognizing the interconnectedness of physical, mental, and emotional aspects of health in medication management.
- **Healthcare Teams**: Working in conjunction with other healthcare providers to deliver comprehensive care that meets all aspects of patient wellness.

### 18.5. Adherence Enhancement Strategies

- **Identifying Barriers to Adherence**: Understanding challenges that patients may face in adhering to medication regimens, and implementing strategies to overcome these obstacles.

### 18.6. Significance and Benefits

- **Optimized Patient Outcomes**: Patient-centred care enhances medication adherence, reduces adverse effects, and improves overall health conditions.
- **Patient Satisfaction**: Empowering patients with knowledge and involving them in decision-making leads to higher satisfaction and trust in healthcare providers.
- **Enhanced Safety and Quality of Care**: Thorough monitoring and personalized approaches minimize risks associated with medication use.

## MODULE -K

## Understanding Pharmacy Practice: Combining Clinical Problem-Solving, Rational Drug Use, Dispensary Practice, and Pharmacoeconomics through Training Modules

### 1. Practical Training for Clinical Problem-Solving

Practical training in clinical problem-solving is pivotal for pharmacists to navigate real-world scenarios effectively and promote rational drug use. Here's how these aspects can be integrated into training modules:

- **Clinical Case Studies and hands-on Exercises Simulated Scenarios**: Create a master plan mimicking real-world clinical situations where pharmacists need to make decisions.
- **Interactive Sessions**: Engage trainees in role-playing exercises to simulate patient-pharmacist interactions in various scenarios.
- **Problem-Based Learning**: Utilize case studies that require critical thinking and decision-making to resolve medication-related issues.
- **Root Cause Analysis**: Teach methodologies to identify the underlying causes of medication-related problems.
- **Collaborative Decision-Making**: Emphasize teamwork and collaboration with healthcare providers to solve complex patient cases.
- **Ethical issues**: Explore ethical considerations and decision-making frameworks when faced with challenging situations.

**2. Promotion of Rational Drug Use:** Educating patients on appropriate medication usage

- **Patient Counselling Techniques**: Train pharmacists in effective communication to educate patients about their medications, including dosage, administration, and potential side effects.
- **Communication**: Teach strategies to simplify medical jargon and convey information in a patient-friendly manner.

- **Compliance**: Introduce tools like medication calendars or pill organizers to aid patients in adhering to prescribed regimens.

**3. Implementing strategies to minimize medication misuse**

- **Risk Mitigation Plans**: Discuss strategies to prevent medication misuse, such as developing protocols for controlled substance dispensing and monitoring.
- **Patient Empowerment**: Educate patients on the risks of self-medication and the importance of following healthcare provider instructions.
- **Monitoring compliances**: Implement methods to monitor and support medication adherence, such as follow-up calls or reminder systems.

**4. Dispensary Practice and Pharmacoeconomics:** Integrating dispensary practice and Pharmacoeconomics into training modules for pharmacists is essential for comprehensive pharmaceutical care. Here's how these topics can be covered:

**5. Dispensary Protocols and Procedures:** Dispensing Guidelines and Error Prevention

- **Accurate Dispensing Practices**: Train pharmacists in precise medication dispensing techniques to minimize errors.
- **Verification Processes**: Implement double-checking procedures to ensure the correctness of dispensed medications.
- **Error Reporting Systems**: Educate on the importance of reporting and addressing dispensing errors promptly. Proper Packaging Techniques: Demonstrate appropriate packaging methods to maintain medication integrity.
- **Documentation Requirements**: Train pharmacists in maintaining comprehensive records and documentation to comply with regulatory standards.

**6. Pharmacoeconomics Basics**

- **Cost-Benefit Analysis**: Educate on evaluating the balance between the cost of treatment and the health benefits achieved.
- **Comparative Effectiveness**: Teach methods to compare various treatment options in terms of their effectiveness and costs.
- **Budget-Assessment**: Introduce techniques to assess the financial impact of implementing specific medications or treatment protocols.

**7. Analysing economic implications in healthcare decisions**

- **Resource Allocation**: Discuss strategies for optimizing resource utilization while maintaining quality care.
- **Healthcare Policy Impact**: Explore the economic implications of healthcare policies on medication accessibility and affordability.
- **Patient Outcomes and Costs**: Emphasize the relationship between healthcare expenditures and patient health outcomes.
- **By incorporating these elements into training modules**: Pharmacists gain proficiency in dispensary operations, ensuring safe and accurate medication dispensing while adhering to labelling and documentation standards.

Understanding Pharmacoeconomics enables pharmacists to critically evaluate medication choices, considering both clinical effectiveness and economic impact. This knowledge supports informed decision-making in healthcare, contributing to cost-effective treatment plans and improved patient health.

## MODULE -L

## PRINCIPLES OF DISPENSING OF DRUGS

### What is Drug?

- According to WHO "Drug is any substance or product that is used or intended to be used to modify or explore physiological systems or pathological states for the benefit of the recipient."

- Drug is a substance which is intended for internal or external use of all the living systems including human beings or animals and these are used for the diagnosis, treatment, mitigation or prevention of any disease or disorder in human beings or animals.
- Substances other than food products which alter the structure of human body or helps in the destruction of insects or vermin that cause the diseases.
- It also covers the various devices which are used for the purpose of internal or external use in diagnosis, mitigation, treatment, or prevention of any diseased condition in living system including human beings or animals.

When there is any abnormality in the functioning of the body, drugs are intended to exert beneficial effect by affecting following systems of the body.

1. Respiratory system
2. Digestive system
3. Integumentary system
4. Immune system
5. Cardiovascular system
6. Nervous system
7. Reproductive system
8. Excretory system
9. Musculo-skeletal system
10. Lymphatic system
11. Endocrine system

### Drugs & Medicines

Drug is the Active substance (Drug) or Active Pharmaceutical ingredient (API).

Medicines are composed of two main components;

a) Active substance (Drug) or Active Pharmaceutical ingredient (API)
b) Inactive substance (Excipients)

The active substance is the drug itself that alters the changes in the physiological functions of the body, is the vital component of any medicine. An inactive substance/excipient has no medicinal properties. Excipients aids in lubricity, flowability, disintegration, taste and may confer some form of antimicrobial function.


**Fig. 1 Representation of a medicine**

Interaction of drug/medicines with body (living system) can be studied in two broad terms i.e. pharmacokinetics and pharmacodynamics.

**Pharmacokinetics** may be defined as the rate of absorption, distribution, metabolism, and excretion **(ADME)** of drug**.** In broad sense, what the body/living system does to the drug.

**Absorption**

Drug absorption refers to the movement of a drug from its site of administration to the systemic circulation. Except i.v. route which has 100% bioavailability; however, drug administered by other routes have to cross the biological membrane to reach its site of action.

**Diffusion** is the process in which drug particles moves according to the concentration gradient from a region of higher concentration to region of lower concentration within the body.

When drugs are given orally, the small intestine is the primary site of absorption because of the very large surface area.

During the movement of the drug from site of absorption to systemic circulation; drug may get metabolized by different part of the body such as gastric mucosal membrane, endothelial cells of the blood vessels and liver, which is known as **first-pass metabolism.**

**Distribution**

Distribution is the process in which drug molecules after absorbed within the bloodstream enter into the different tissues or organs of the body. Lipid solubility and protein binding are important factor governing the distribution of the drug. Highly lipid soluble drugs can easily access to the blood brain barrier and have high volume of distribution whereas more plasma protein binding of the drug leads to less availability of drug for tissue binding, thus have low volume of distribution ($V_d$).

$$V_d = \text{Dose administered} / \text{Plasma concentration}$$

**Metabolism**

Drug metabolism is the process of biotransformation or any chemical modification within the drug molecules in order to convert it to more water-soluble form so that it gets easily eliminated from the body. The majority of metabolic processes occurs in the liver. Most of the drugs are inactivated after metabolism but some drugs get activated after biotransformation, known as prodrug.

Various enzymes which are responsible for the metabolism of the drug are present in the endoplasmic reticulum of the cell. For example- Cytochrome P-450

**Excretion**

**Excretion** is the process of eliminating drug and their metabolites in urine, feces, saliva, sweat, breast milk, breath, and tears. Moreover, urine is the major route of excretion for most of the drugs.

**Pharmacodynamics**

It is referred as “what a drug does to the body”. It includes interaction of a drug with a particular site of the cell i.e., receptors. Interaction may be physical (Charcoal), chemical (Antacids) or enzymatic (Carbidopa) interaction.

**Synergism**

**Synergism** refers to the cooperative effect of two or more drugs given together to produce a stronger effect where the effect of one drug is facilitated by another drug.

The following terms are used in describing drug-receptor interaction.

**Agonist** - These are chemical agents having affinity (interaction with receptor) and intrinsic activity (capacity to produce some conformational change within the receptor).

**Antagonist**- These are the chemical agents having affinity but no intrinsic activity. They do not have their own effect but block the action of an agonist on the receptor.

**Drug Interactions**

A drug-drug interaction describes a situation in which one drug affects the activity of another, that may cause side effects that are unexpected or sometimes severe or life threatening. Drugs may also interact with food or drinks, which can lead to low drug effect or delayed absorption of drug.

**Drug Half-Life**

The **half-life** of a drug is the time in which the drug concentration reduced by 50% within plasma. The half-life of each drug may be different: for example, a drug with a short half-life, such as 2 or 3 hours, will need to be administered more times as compared to drug with long half-life, such as 8 hours.

**Bioavailability** may be defined as the rate and extent of absorption of the drug in its unchanged form from its site of administration to systemic circulation.

**Drug Toxicity**

Most of the drugs are capable of producing toxic effects. There is a range between the therapeutic dose of a drug and its toxic dose. This range is measured by the therapeutic index, which is used to explain the safety of the drug

**Therapeutic index (TI) = *LD*50/*ED*50,**

LD50 is the lethal dose of a drug that kills 50% of animals tested

ED50 is the effective dose that produces a therapeutic effect in 50% of animals tested.

**Adverse drug effect**

These are undesirable or unwanted effects observed after administration of a drug.

Different types of adverse effects of drugs are as

Type A – Predictable – Mostly occurs at high dose

Type B – Unpredictable or Bizarre (Idiosyncratic) – Can occur at low dose also

**Hypersensitivity reaction**

**Hypersensitivity** (**intolerance**) is an abnormal physiological condition in which there is an undesirable and adverse immune response to foreign agents/antigen that differ from pharmacodynamic effect of a drug. It is caused by many types of particles and substances from the external environment or from within the body that are recognized by the immune cells as antigens.

**Labels of Medicine**

The medicine labels and package insert contain the information about the drug. To prepare and dispense medicines, you must understand information that appears on the labels, including the medicine name, dosage form, dosage strength, total amount in the container, route of administration, warnings, storage requirements, and manufacturing information etc.

- The minimum information on label shall include.
  - i. Generic/Brand name of drug
  - ii. Quantity of product
  - iii. Strength of active ingredient (Dose)
  - iv. Quantity of Excipients
  - v. Name and address of manufacturer
  - vi. Date of manufacturing
  - vii. Date of expiry
  - viii. Special instructions for usage & storage

1. **NAME OF MEDICINE**

   Every medicine has an official name-its generic name and may have the proprietary, trade or brand name.

   **GENERIC NAME**

   A **term** referring to the chemical makeup of a drug rather than to the advertised brand **name** under which the drug is sold.

   **BRAND NAME**

   These are names given to medicines, which are different from the name of its active ingredient, making these medicines branded ones.

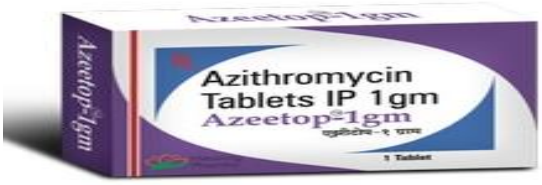



**Fig. Illustration of brand of drug**

## 2. DOSAGE STRENGTH

The dosage strength or strength of a medicine is the quantity or amount of active ingredient per dosage unit in the medicine. The strength of any drug is always written medicine label.


**Fig. Demonstration of dosage strength**

## 3. DRUG COMBINATION

The generic names and dosage strengths of all components of a combination drug must appear on the label.


**Fig. Illustration of combination of drug**

## 4. TOTAL VOLUME IN CONTAINER

Total volume of any medication packaged in a single container to be administered as per need of the patient.


**Fig. Illustration of total volume of container**

## 5. STORAGE INFORMATION

Medicines are to be stored under specific conditions to maintain their potency and effectiveness. Storage information will appear on the drug's label. The label may have information about storage temperature, exposure to light, or the length of time the drug will remain potent after the container has been opened.

## 6. MANUFACTURING DETAILS

FDA regulations state that every drug label must include the name of the manufacturer with detailed address, date of manufacture, expiry date, after which the drug may no longer be used; and the lot number.

### PACKAGE INSERTS

A **package insert** is a document that provide complete and authoritative information about that drug and its use.

| SECTION | DESCRIPTION |
|---|---|
| Description | Chemical and physical description of the drug. |
| Clinical Pharmacology | It tells how the medicine works in the body, how it is absorbed and eliminated, and what its effects are likely to be at various concentrations. |
| Indication and Usage | This refers to uses (indications) for which the drug has been FDA-approved (e.g. migraines, seizures, high blood pressure). |
| Dosage and Administration: | This section explains the FDA recommended dosages of the medication and how to take the medication. |
| Contraindications | This section lists situations in which the medication should not be used. |
| Warnings | This covers possible serious side effects that may occur |
| Precautions | This explains how to use the medication safely including physical appearance and drug interactions; |
| Adverse reactions | This section lists all side effects that were reported while the medication was being studied in clinical trials, including uncommon side effects. |
| Drug abuse and dependence | This provides information regarding whether prolonged use<br>of the medication can cause physical dependence (only included if applicable) |
| Over dosage | This gives the results of an overdose and provides<br>recommended action in such cases |
| Drug Interactions: | This section is often hard to interpret. Depending on the drug interaction, there may be different recommendations for monitoring, dose reductions, discontinuation of concomitant medications, etc |
| Manufacturer supply | This section explains in detail the physical characteristics of the medication including color, shape, markings, etc. |

## MODULE -M

## RATIONAL USE OF DRUG

Worldwide most of the medicines are prescribed, dispensed or sold inappropriately, while patients fail to take them correctly.

**What is rational drug use?**

Patients will receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them.

Rational drug use will ensure

i. Safety
ii. Efficacy (can give better results)
iii. Cost of effective use of medicines.

## PRECAUTIONS DURING DRUG USE

Anytime a drug is to be used, a number of basic precautions need to be considered. These include the following:

**1. Pregnancy:**

Drugs can have harmful effects on the embryo or fetus at any time during pregnancy. It is important to keep in mind when prescribing for a woman of childbearing age. During the first trimester drugs can produce congenital malformations (teratogenesis), and the period of greatest risk is from the third to the eleventh week of pregnancy. During the second and third trimesters drugs can affect the growth or functional development of the fetus, or they can have toxic effects on fetal tissues.

**2. Lactating Mothers**

Many medicines are excreted through the breast milk which can have harmful effects on the baby.

**3. Pediatrics or Children**

Children and particularly neonates differ from adults in their response to drugs. Special care is needed in the neonate period (0-28 days of life) and doses should always be given with care with the appropriate measuring device because of the risk of toxicity due to the fact that their organs are not well developed.

**4. Geriatrics or Elderly**

Elderly patients may have reduced or weaken organ function hence their ability to metabolize and excrete medicines may be impaired.

5. **Patients with Chronic conditions**

A drug given to treat one disease can exacerbate another disease regardless of patient age, hence if an elderly patient request for an OTC medicine but has other conditions should be referred to the pharmacist.

6. **Functioning of Kidney and Liver:**

When one has liver or kidney dysfunction or impairment, care should be taken in the administration of certain drugs. This is because drug metabolism and elimination is prolonged during the renal and hepatic dysfunction.

7. **Mode of Use:**

This is very important, since to obtain maximum benefit from drugs they must be used as instructed by the manufacturer or the one dispensing the drug.

8. **Time and duration of use:**

The time a particular drug is to be taken is very important. Some drugs like statin are mostly taken during night. One should always take note of the time the drug should be taken. Duration of use of drugs is also important and this information is normally supplied by the manufacturer or dispenser.

## COMMON MISUSED AND ABUSED DRUGS

**Drug Misuse:** This refers to not using the drug for the right purpose.

**Drug Abuse:** This refers to the over dosage or over-using of drugs.

Some commonly abused or misused drugs are

1. Sleeping tablets (Diazepam)
2. Caffeine (as in APC) - Addicts
3. Antibiotics -e.g. Amoxycillin/tetracycline for waist pains & stomach ache

## CONSEQUENCES OF DRUG OVERDOSE AND UNDER DOSE

The manufacturer or dispenser always informs the patient on the quantity of drug to be taken at any given time;

**Over dosing:**

This can cause:

- Damaging effects on liver, kidney and other organs.
- Poisoning, due to high toxicity
- Worsening state of patient.

- Death

**Under dosing:**

This can cause:

- Ailment not being well treated
- Recurrence of the disease, e.g. Malaria
- Worsening of state of patient
- Death

## MODULE -N

## USAGE OF DETERIORATED AND EXPIRED DRUGS

These drugs are harmful and unfit to take. Some simple ways of detecting a product that is deteriorated and expired are as follows:

a. **Alteration in the Color of the medicine**

Several products changes its original color if expired or deteriorated, a change in color in most cases indicates a chemical change and this means the product could have different properties.

b. **Change in taste**

A new taste also indicates a new chemical substance in the product.

c. **Change in Smell of the medicine**

A change in smell indicates deterioration in the given product due to the change in chemical substance.

d. **Change in morphology**

If the morphology of the product has changed which makes the product harmful for the patient. For example, mould/fungal growth.

e. **Product breakage**

The bottle containing the product may be broken and glass particles may be deposited in it thereby changing its physical nature thus making the product harmful to take.

**Causes of harmful Products**

**a. Deterioration**

This means degeneration in the condition of a drug or medicine. It also means worsening in the condition of a substance, drug, or medicine. Deteriorated products which have not reached their expiry date should be removed from the shelves.

Factors that can cause medicines to deteriorated and become harmful includes;

**b. Poor storage Conditions**

a. Exposure to direct sunlight
b. Exposure to Moisture: This can cause some products to take up moisture (water) which can deteriorate the drug.
c. Temperature: Products can be made to undergo Physical and chemical changes when exposed to high temperature.
d. Pests and rodents: Products not protected from rodents or any other pests may

be contaminated and must not be sold out to consumers.

**c. Expired Drugs:**

Drugs that reached their expiry date must always be removed from the shelf.

## MODULE -O

## DOSAGE FORMS AND ROUTES OF ADMINISTRATION

### DRUG DOSAGE FORMS:

There are different dosage forms. This is the way or form a dose of a drug is presented as a medicine. Dosage forms can be group or classified as;

a. Solids
b. Semisolids
c. Liquids
d. Gaseous

A particular drug could be presented in different dosage forms. For example, paracetamol comes as a tablet, syrup and suppository.

### Miscellaneous Dosage Forms

**1. Transdermal Patches:**

It is a process to administer local and systematic medications that gets absorbed from the skin into the blood stream for an extended period of time.

**2. Aerosol Sprays:**

Medications in the aerosol dosage form are in pressurized containers with ingredients in a solution including propellants. Propellants are pressurized gases that push the solution out of the containers. An example of a medicine formulated as an aerosol is salbutamol inhaler which is used for asthma.

### ROUTES OF ADMINISTRATION

Route determines the entry of drug into the body. All drugs have to be administered in one way or the other.

**Enteral medications** are given orally and pass through the GI tract to be absorbed into the bloodstream and metabolized by the liver. This includes oral, nasogastric, and rectal routes.

**Parenteral medications** are injected or placed into the body tissues and do not pass through the liver before entering the bloodstream. In pharmacy, parenteral refers to injection.

**Inhalational** routes of administration are inhaled through the mouth or the nose and usually act directly on the respiratory system before entering into the bloodstream. They are often used to treat respiratory diseases, but gases are inhaled for general anesthesia as well.


| ROUTE | INSTRUCTION |
|---|---|
| Oral | For medicines swallowed by mouth (Capsules, Tablets, Syrups, etc) |
| Topical | For medicines that are applied to the skin surface or a mucous membrane. (Creams, ointment, mouthwash, gargles, lotions, etc) |
| Ophthalmic | drops or ointments applied to the eye |
| Otitic | drops placed or instilled in the ear |
| Vaginal | inserted in the vagina |
| Inhaler | taken in through mouth or nose by breathing in or inhaling |
| Sublingual | dissolved under the tongue |
| Anal/Rectal | Inserted into the rectum |
| Transdermal | absorbed through skin through application of a patch |

## MODULE -P

## CALCULATION OF DOSES

Administration of the medications prescribed for the patient must be accurate and the amounts must be correct. Medicine counter assistants must have a comprehensive knowledge of the weights and measures used in drug administration for prescribed amounts. Three systems are used for measuring medication and solutions: **metric system**, **apothecary system**, and **household system**. It is necessary for the medicine counter assistant to know each system and be able to convert from one system to another. Most medications and measurements used in the health care field are calibrated and calculated by the metric system.

Volume also includes two additional parameters for dosage calculations: quantity and concentration. The most commonly used metric volume unit for dosage calculations is the milliliter.

### The Metric System

Now a day, the metric system is the system of choice when one deals with the weights and measures involved in the calculation of drug dosages.

Its accuracy and simplicity are related to its basis on the decimal system, which is based on units of 10. The use of decimals can eliminate errors in measuring medications. The three basic units of the metric system are the following:

1. **Gram**: the basic unit for weight
2. **Liter**: the basic unit for volume
3. **Meter**: the basic unit for length

### DISPENSING EQUIPMENT

A variety of containers are used to dispense medicines in the pharmacy. These containers are used for tablets, capsules, liquids, creams and ointments.

However, there are certain equipments one need to have when working at the dispensary to facilitate his/her work. This includes;

1. Napkins
2. Pen
3. Calculator
4. Scissors
5. Measuring cups

6. Water bottle
7. Gloves
8. Nose mask
9. Carrier bags
10. Pill envelopes
11. Mortar and pestle
12. Paper stickers for labelling
13. Reference books
14. Weighing scale
15. Pill cutter
16. Tablet counting tray etc.

## MODULE -Q

## PRESCRIPTION

A prescription is a written order from a doctor or medical practitioner to a pharmacist/dispenser to supply drugs to a patient. Each prescription bears some important features.

**Rx**

This is the order from the doctor. Translated from Latin it means 'give thou'. It is usually at the top left of the prescription.

**IMPORTANT FEATURES**

(I) The drug to be given
(II) The dose to be given
(III) The dosage of the drug
(IV) The signature of the prescriber in ink (Indelible)
(V) The address of the clinic or hospital.
(VI) The form in which the drug should be supplied e.g. syrup, tablet, ointment, capsules. etc.
(VII) Date the prescription was written
(VIII) Name and address of the patient

**TERMS USED IN PRESCRIPTION**

**For Dosage forms**

| Abbreviation | Meaning / Intended Meaning |
|---|---|
| Amp | Ampule |
| aurist. | ear drops |
| cap. | Capsule |
| co. | Compound |
| collut. | Mouthwash |
| collyr. | eye lotion |
| cr, crm | Cream |
| crem. | Cream |
| elix. | Elixir |
| emuls. | Emulsion |
| gtt. or guttae | Drops |
| IUD | intrauterine device |
| liq. | Liquid |
| Lot | Lotion |
| MDI | metered-dose inhaler |
| mist. | Mixture |
| narist. | nasal drops |
| oculent. | eye ointment |
| past. | Paste |
| Pess | Pessary |
| pulv. | Powder |
| Sol | solution; in solution |
| Sup | Suppository |
| Susp | Suspension |
| syr. | Syrup |
| Tab | Tablet |

**For Dose abbreviations**

| Abbreviation | Meaning / Intended Meaning |
|---|---|
| Cm | centimeter |
| dL | deciliter |
| fl or fld | Fluid |
| Ft | Foot |
| G, or g, or gm | Gram |
| gr. | Grain |
| gtt, gtts | drop, drops |
| guttat. | drop by drop |
| HS | half-strength |
| IU | international unit |
| L | Liter |
| lb. | Pound |
| Mcg | microgram |
| mEq | milliequivalent |
| mEq/L | milliequivalent per liter |
| Mg | milligram |
| mL | milliliter |
| Oz | Ounce |
| O.C | Ointment |
| q.s., qs | as much as needed |
| q.s. ad | add sufficient quantity to make |

**For Dose Frequency**

"The Roman numerals provided can also indicate the prescribed quantity of a medication, generally in the form of a solid dosage, available in the market with a single strength."

| | | |
|---|---|---|
| I | i | One |
| II | ii | Two |
| III | iii | Three |
| IV | iv | Four |

**For Dose Time**

"To ensure effectiveness and safety, medications should be taken at specific time intervals. The common abbreviations used to indicate the timing or frequency of medication intake within a given period are listed below:"

| Abbreviation | Meaning / Intended Meaning |
|---|---|
| b. | Twice |
| b.d. | twice daily |
| b.i.d. | twice daily |
| bid, BID | twice a day |
| BT | Bedtime |
| d. | a day |
| h, or hr. | Hour |
| hs or HS | at bedtime, hours of sleep |
| Mane | in the morning |
| n or noct. | in the night |
| noct. maneq. | night and morning |
| o.alt.hor. | every other hour |
| o.d. | once per day |
| o.d. | every day |
| o.m. | every morning |
| q.d. | Every day |
| q.d.s. | to be taken four times daily |
| q.i.d. | four times daily |
| q.q.h. | every fourth hour |
| q12h | every 12 hours |
| q12h | every 12 hours |
| q2h | every 2 hours |
| q3h | every 3 hours |
| q4h | every 4 hours |
| q4h | every 4 hours |
| q6h | every 6 hours |

| | |
|---|---|
| q6PM, etc | every evening at 6 PM |
| q8h | every 8 hours |
| qam | every morning |
| qd, q1d | Daily |
| qd, QD | every day |
| Qh | every hour |
| Qhs | each night at bedtime |
| Qid | four times a day |
| Qn | Nightly or at bedtime |
| qod, QOD, q.o.d | every other day |
| qq. | Every |
| Rep | Repeats |
| Stat | Immediately |
| t.d.d. | three times daily |
| t.d.s. | to be taken three times daily |
| t.i.d. | three times daily |
| tid ac | three times a day before meals |
| TID, t.i.d. | three times a day |

**For Route of Administration**

| Abbreviation | Meaning / Intended Meaning |
|---|---|
| AAA | apply to affected area |
| AD | right ear |
| a.s., AS | left ear |
| AU | each ear; both ears |
| Garg | Gargle |
| IJ | Injection |
| IM | Intramuscular |
| IN | Intranasal |
| Inf | Infusion |
| inj. | Injection |
| instill. | Instillation |
| IP | Intraperitoneal |
| IV | Intravenous |
| IVP | intravenous push |
| per os | by mouth, orally |
| PO, p.o. | orally or by mouth |
| PR, p.r. | per the rectum |
| PV | per the vagina |
| SL, s.l. | sublingual, under the tongue |
| SQ, SC, sub q | Subcutaneously |

**PRESCRIPTION READING**

The authority to write prescription is solely under the licensed practitioner. The prescription functions as the mean of communication for the pharmacist to about the various medicines prescribed by the doctor to patient. Pharmacist after receiving the prescription should read it, understand the order, evaluate the appropriateness, check its correctness and completeness and accordingly fill / refill the prescription. Those Prescriptions which are not clear, legible or ambiguous are referred to pharmacist for dispensing, and shouldn't be dispensed to the patient.

The format for interpreting a prescription is quite simple. Most prescriptions are written starting with;

Dosage form, Name of the medicine, the dose to be taken, the number of times the dose will the taken and the duration for taking the medicine.

**Example 1**

Interpret the prescription below;

1. Tab Paracetamol 500mg i tid x 1/52
2. Cap Amoxicillin 250mg i tid x 1/52
3. Tab Cetirizine 10 mg q.h.s x 1/52

**Answer:**

Four medicines are prescribed;

The first is Tablet Paracetamol 500mg, one tablet to be taken three times daily for one week

The second is Tablet Amoxicillin 250 mg, one tablet to be taken three times daily for one week

The third tab cetirizine 10 mg, one tab to be taken one time at night for one week.

**Note-**The prescription has no Name and signature of the prescriber hence it is considered invalid

## MODULE -R

## SUPPLY OF OVER THE COUNTER (OTC) DRUGS

### THE DISPENSING PROCESS

- The dispenser correctly interprets the prescription or instructions on the prescription.
  - Checks the list of drugs
  - Check the dosages, administration, and duration
  - Check the drug availability
  - Retrieves from storage area
- The dispenser receives the correct prescription from the patient or prescriber (written or oral).
  - Patient details
  - Therapeutic relevance
  - Cost-effectiveness
  - Communication for unclear prescription instructions

- The prescribed therapy should be available in correct form (not expired or damaged).
  - Ensure drug storage
  - Check expiry dates and previous stock should be used first (first in first out; FIFO)
  - Check and double check (if possible) the drug product for accuracy of identity, strength, and dose form.

- The dispenser directs the patient to take the medication in a correct way
  - Label with patient's name, drug name, directions for use, date of dispensing, identity of prescriber; and identity of dispenser
  - Symbolic instructions for illiterate people

- The patient understands the instructions from the dispenser.
  - Repeat orally the labeled instruction, if possible, in laymen's terms
  - Patient should repeat the instructions back to the dispenser
  - Emphasize the need for compliance
  - Provide warnings and cautions

- Give special attention to certain cases, e.g.
  - Pregnant women
  - Those with visual or hearing impairment
  - Children and elderly patients
  - Patient having co-morbid conditions

- The dispenser keeps accurate records of operations.
  - Entry of patient details
  - Entry of record in prescription register
  - Complete inventory records
  -

**DISPENSING ERRORS**

- Wrong interpretation of the prescription (or diagnosis)
- Retrieval of the wrong drug from stock
- Wrong dosages
- Inadequate packaging/labeling of proprietary drugs
- Inaccurate counting, compounding
- Inadequate or nonexistent labeling
- No knowledge of proper drug compliance
- Insufficient knowledge of the disease process
- Insufficient time to talk with patients about their drugs

## STANDARD OPERATING PROCEDURE (SOP) FOR REMOVAL OF MEDICINES FROM SHELVES.

**RATIONALE:** Adequate measures for removal of medicines from shelves are important for reducing dispensing errors and also to expedite the dispensing process.

**PROCEDURE:**

1. Once the prescription is received, review the prescription for its contents, ensure its correctness and completeness.
2. Depending on the medicine prescribed, move towards the corresponding shelf.
3. While removing the medicine, ensure that you are taking out the right medicine.
4. After removing the medicine, reconfirm the name of the product. Check details like the batch number and expiry date. **Take special care while checking the expiry date**.

5. When removing the medicines, always remove the medicine from the front (that having an earlier expiry). If the medicines are stored on the FEFO basis, bear in mind that the medicines with the longest expiry have been placed either farthest to the back or to the left.
6. While issuing/dispensing tablets/capsules: Take care while cutting strips. Patients sometimes wish to take lesser medicines than prescribed.
7. Certain kits comprise of fixed doses of drug. For example: a kit of Amphotericin B, voriconazole and Clarithromycin tablets is indicated for a particular infection. Do not cut the strip, as the course of therapy will not be completed.

**For liquids: -**

8. After removing the bottle from shelves, wipe it clean before delivering it to the patient.
9. Take care that the bottle is not damaged and there is no evidence of leakage.

**General instructions: -**

10. After removing medicines from the refrigerator e.g. suppositories and certain injectables, counsel the patient about storage of the drug.
11. Train the personnel adequately for removal of medicines from shelves with clean hands. Use a clean apron at all times.
12. Upon removing injectables and certain clear solutions check that the solution is not dis-colored or no particles exist.

## STANDARD OPERATING PROCEDURE (SOP) TO MINIMIZE DISPENSING ERRORS.

**RATIONALE:**

1. This is an activity, which remains the focus of the pharmacy profession
2. Clients/patients play a very important role in the business/economy of the pharmacy. So utmost care has to be taken to minimize dispensing errors.
3. It is therefore important that pharmacists follow the SOP for dispensing and are suitably trained to offer efficient service to customers.
4. Make eye contact and receive the prescription in a dignified manner.
5. Check the prescription for legality & legibility.
6. Read the prescription properly - the name, strength, dose, quantity. Confirm with Pharmacists any time to ensure patients safety.
7. If the prescription is illegible or in case of doubt, confirm with the doctor over the phone. If the customer does not have a prescription, listen to the customer carefully to know the exact name, strength and quantity of drug to be dispensed. Do not dispense a prescription medicine without a prescription.
8. Check for stock availability of all the medicines to be dispensed.

9. Remove the medicines and confirm the quantity with the client.
10. Keep the medicines together in a container in front of the client.
11. Give the customer relevant information or explain any instructions regarding administration or storage etc.
12. Proceed for billing only after confirming with the client.
13. While billing, check the medicines against the prescription to ensure dispensing of the right medicines.
14. After billing, the person assembling and the one billing should sign the bill. If either of them is not a pharmacist then get it checked and signed by a pharmacist.
15. Give the original bill to the customer and retain the duplicate
16. Pack the medicines and keep the parcel along with the duplicate bill.
17. Ensure the delivery of the RIGHT parcel to the right customer

## MODULE -S

## MANAGEMENT OF COMMON DISEASES

### INTRODUCTION

This module highlighted on diseases of common occurrence and their management. As a pharmacist, you must be familiar with these common diseases and its management. For the pharmacist to manage their time effectively they are reliant on the skills and knowledge and their capacity to adhere to standard protocols. As the healthcare professional with responsibility for providing this service, the pharmacist must ensure that this largely delegated task is of the highest standard.

This module covers management of common diseases such as

a) Common cold
b) Pain
c) Cough
d) constipation
e) Diarrhoea and other

ii. FIRST AID
a) Basic Life Support
b) Wound management
c) prevention and control of Infections

## FEVER & ITS MANAGEMENTS

Fever is when a human's body temperature rises above the **normal range of 36–37°** Centigrade **(98.6°–99° Fahrenheit).** It is a common medical sign seen during;

(a) Infection
(b) Inflammatory disorders (swelling)
(c) Some drug treatments

The hypothalamus is the center of the thermoregulatory system which regulates the body temperature and responsible for maintaining it at a set point of 37ºC.

Different grades of fever can be:

- low grade, from 100.5–102.1°F or 38.1–39°C
- moderate, from 102.2–104.0°F or 39.1–40°C
- high, from 104.1–106.0°F to or 40.1-41.1°C
- hyperpyrexia, above 106.0°F or 41.1°C

Acetaminophen (Paracetamol) generally is effective for only fever and its associated pain.

## PAIN & ITS MANAGEMENT

The definition of pain, according to the International Association for the Study of Pain, is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" The fact remains that pain is just an **alarm signal** telling us that something abnormal is happening in the body.

**Different types of pain**:-

**Acute pain:** Acute pain often starts suddenly and feels 'sharp'. It can be caused by many different things, such as, an operation, a broken bone, an infection. It is usually short-term, but it can sometimes last for weeks or months.

**Chronic pain:** Chronic pain lasts for a longer period of time. It's usually caused by the chronic diseases e.g cancer.

Other types of pain are

**Bone/joint pain:** If pain is originating from bone or joint, it can term as bone pain. It can happen due to injury or ant underlying disease e.g arthritis.

**Nerve pain:** This is pain caused by nerve damage. It may be due to the cancer or due to neuropathy caused by disorders such as Diabetes. The pain can often continue even after the treatment. Nerve pain is also called neuropathic pain.

**Muscle pain:** Also known as myalgia, this pain involves the muscles and occurs after excessive exertion or during inflammation.

**Management of pain**

**Physical approach**

- Hot compression
- Ice pack.
- Exercise or rehabilitation

**Medications**

An **analgesic** also known as a pain reliever (**painkiller**) is any member of the group of drugs used to relieve pain (achieve analgesia). The word *analgesic* derives from Greek *an-* ("without") and *algos* ("pain"). The painkillers which are commonly used have three (3) main functions

These are:

a) Relief pain (analgesic)
b) Anti-inflammatory (reduce swelling) and sometimes
c) Reduce body temperature (fever)

## ALLERGY & ITS MANAGEMENT

**Allergy** is a hypersensitive disorder of the immune system.

Allergic reactions occur to normally harmless environmental substances known as allergens; these reactions could be

- Acquired,
- Predictable,
- Rapid

### Management - Antiallergic Drugs (Antihistamine)

These are the medications used for relieving allergies like runny nose, sneezing, watery and itching eyes, itching skin, insect bites and stings and drug allergies (chloroquine).

Some are useful for treating nausea and vomiting e.g. Promethazine (phenergan and avomine).

Broadly, they have two major categories:

1. Sedating antihistamines - It is included in a lot of coughs and cold medicines. It causes the patient to feel dizzy hence called a sedating agent. Patients should be counseled not to operate heavy machinery while on the medication such as driving. e.g., Piriton and Phenergan

2. Non-sedating antihistamines - It is very useful in relieving itching and runny nose.it is a **non-sedating** and hence causes less dizziness. e.g, loratadine & fexofenadine

## COMMON COLD & ITS MANAGEMENT

It is an infection of the upper respiratory tract, particularly the nasopharyngeal mucosa and sinuses. It is contagious and spread via airborne droplets, as well as from hands and contact with contaminated surfaces.

If the 'cold' persist for more than a week along with high fever and discomforting cough, a diagnosis of influenza may be considered. In influenza, symptoms of cough and cold are more pronounced. Secondary bacterial infection may be associated with purulent phlegm or offensive nasal discharge and fever. The symptoms subside without usage of an antibiotic.

**Symptoms**

- Runny nose (rhinorrhea)
- Sneezing
- Nasal congestion
- Mild fever
- Headaches
- Sore throat
- Muscle aches
- Cough
- Fatigue
- Malaise

**Signs**

- Low grade fever
- Nasal discharge
- Nasal mucosa reddening
- Watering of eyes

**Prevention of cold**

(1) Washing hand with soap and hot water
(2) Keeping hands away from the nose and eyes
(3) Washing contaminated objects or surfaces

(4) Using disposable tissues instead of handkerchief
(5) Covering a cough or a sneeze
(6) Getting enough sleep
(7) Eating fruits and vegetables oranges/tomatoes
(8) Keep away from sick people with colds.

**Management of Common Cold**

**Non-pharmacological treatment**

1. Rest
2. Encourage adequate fluid intake
3. Gargle lukewarm salt solution
4. Steam inhalation

**Pharmacological Treatment**

OTC drugs used in cold normally relieve one of the symptoms rather than kill the causative organism of the infection. It's necessary to get rid of the symptoms since they are very uncomfortable.

1. Analgesics & Antipyretics: - For headache and fever e.g. **Paracetamol**
2. Antihistamines: - to decrease histamine induced inflammatory responses. E.g **Cetirizine, Chlorpheniramine maleate**
3. **Decongestants** Decongestants are used to increase drainage of mucous from the nostrils making breathing easy and relieving sinus pain. e.g - Sodium Chloride 0.9% nasal drops, Xylometazoline nasal drops.

## COUGH & ITS MANAGEMENT

The primary reason for coughing is to clear the airway. It is a protective mechanism of the body. Excess secretions and foreign bodies are cleared from the lungs by a combination of coughing and the mucociliary movement. Coughs can be described as either productive (chesty) or non-productive (dry, tight, tickly).

**Management of Cough**

COUGH MIXTURES: Falls into (2) two main groups

**a) EXPECTORANTS**

These are the agent used for removal of the sputum. This are mainly prescribed for the wet cough. E.g - Ammonium Chloride, Guaiphenesin, Carbocisteine

**b) SUPPRESSANTS (ANTITUSSIVES)**

These are the agent used to reduce the frequency of cough. This are mainly prescribed for the dry cough. E,g Codeine, Dextromethorphan

**c) ANTIHISTAMINES**

This work by preventing the release of histamine, thereby reducing the allergic secretion (i.e., phlegm produced) or one coughing as a result of allergy in case of dry cough.

## CONSTIPATION & ITS MANAGEMENT

Constipation is generally defined as a decrease in frequency of fecal elimination characterized by difficult passage of hard, dry stools. It is usually a result of abnormally slow movement of the faeces through large intestines.

### Causes

- Diet deficient in roughage
- Irritable bowel syndrome
- Hypercalcaemia
- Drugs e.g. atropine, codeine phosphate, morphine, tricyclic antidepressants, disopyramide
- Lazy bowel from chronic laxative use

### Management and its Treatment

Laxatives are used to ease or reduce constipation. The patient should be advised to drink at least 6 to 8 full glass of water (240mL) or 5 to 7 sachets of water (300ml) each day when using laxative, to aid stool softening.

* Laxatives should not be used by children below 12 years of age.

## DIARRHOEA & ITS MANAGEMENT

Diarrhea means passing frequent, loose, watery stools 3 or more times a day.

Diarrhoea is often accompanied by vomiting which is very common in children. The commonest cause in this age group is viral, therefore, usually no need to prescribe antibiotics.

Fluid loss occurs quickly in children because of their size. If this is not corrected it may result in dehydration which can be fatal.

### Main causes of diarrhoea

- Poor Nutrition
- Shortage of water and unclean condition e.g. rainy season or areas like slums
- Viral infections (intestinal flu)
- Infection of the ear, measles
- Malaria
- Food poisoning
- Difficulty in babies digesting food, which are new to them
- Side effects of certain medicines e.g. Ampicillin, tetracycline

### Signs of dehydration in diarrhoea

1. Always thirsty
2. Little or no urine (urine dark yellow)
3. Sudden loss in weight
4. Dry mouth
5. Sudden tearless eyes (crying without tears)
6. Loss in elasticity of stretchiness of skin ( If you pull skin up with two fingers and after stretching it, it does not fall back easily

**Management** - Prevention and treatment

- Prevent dehydration by giving ors or i.v fluid
- Maintain nutrition

• Maintain personal hygiene

• In case of infection use drug e.g Metronidazole & Ofloxacin**,**

## WOUND & ITS MANAGEMENT

A wound is an injury to living tissue caused by a cut, blow, or other impact, in which the skin is cut or broken.

It may bleed, may be contaminated with dirt and other foreign matter and may be associated with broken bones.

It may be small or large and may be deep or superficial. It may become infected and infection may spread.

### Signs & symptoms

• Local pain
• Bleeding
• Pus discharge in case of infection. Pus could be hurtful.
• Local swelling and tenderness
• Check for additional wounds to the head, chest, abdomen, bones, or nerves.
• Identify the wound's physical features, such as its location, size, shape, and depth.

### Management

### Non-Pharmacological Treatment

• To stop the bleeding, elevate the injured area and apply a sterile pressure dressing. If pressure is ineffective in stopping severe bleeding, a tourniquet may be used. If a bleeding vessel is found, it needs to be tied off.
• If a tooth socket is bleeding, place a tiny piece of sterile gauze inside it and instruct the patient to bite on it.

### Pharmacological Treatment

➢ Put on sterile gloves and wash your hands well. Use an antiseptic solution to clean the wound.

- USE POVIDONE IODINE Lotion or regular saline to treat the infected wound as often as necessary.
- Give booster doses of the toxoid and tetanus prophylaxis for any wound that may be contaminated, as needed.
- Analgesics can be given for pain management.
- Antibiotics can be given in case of wound infection. E.g. Amoxicillin

**FIRST AID**

First aid is the immediate assistance provided to an injured person until full medical treatment is available. This may avoid major long-term impairment or save a life.

Knowing a few basic facts and some essential information about procedure can mean the difference between saving a life and having to watch someone die.

Priorities in life-threatening medical emergencies are as straightforward as ABC.

**A**irway, **B**reathing and **C**irculation

**Airway:** Is the airway free and clear? Take action to open the airway.

**Breathing:** Is the individual breathing? Take up rescue breathing.

**Circulation:** Does the individual's heart beat? Initiate compressions on the chest.

**First aid Kit**

The following products belong in the perfect kit that will help you be ready for the majority of injuries and home emergencies:

1. Diphenhydramine
2. Antibiotic ointment or cream
3. Activated charcoal (only use if instructed by the Poison Control Center)
4. Antacid (liquid)
5. Calamine lotion
6. Antihistamine cream
7. 1% hydrocortisone cream
8. Povidone-iodine solution

9. Aspirin, acetaminophen, and ibuprofen
10. Antimalarial
11. Sterile eye-wash solution
12. Epinephrine auto-injector kit (if prescribed by your doctor)
13. Extra prescribed medications (such as inhalers)

Also included in your kit should be bandages and dressing materials such as:

1. Commercial Band-Aid bandages
2. Sterile cotton balls
3. Cotton-tipped swabs
4. Sterile gauze (pads and rolls)
5. Elastic bandage rolls
6. Extra bandage clips
7. Butterfly bandages
8. Sterile eye patches
9. Regular adhesive bandages (multiple sizes)
10. Adhesive tape (waterproof and stretchable)
11. Triangular bandages
12. Large foil-lined bandage
13. Bulb syringe
14. Medicine spoon (transparent tube marked with typical dosage amounts)
15. Small paper cups
16. Clean cloths and tissues
17. Hand sanitizer
18. Digital thermometer (and rectal thermometer for babies less than one year old)
19. Small jar of petroleum jelly
20. Sterile disposable gloves
21. Disposable CPR face mask
22. Safety pins
23. Scissors (the sharp, angular style with rounded end)
24. Tweezers
25. Tooth-preservation kit
26. Space blanket
27. Penlight
28. Small pad of paper and pencil
29. Emergency candle and waterproof matches
30. Disposable self-activating cold and hot packs

31. Magnifying glass
32. Whistle
33.

## BURNS & ITS MANAGEMENT

Damage to the skin or deeper tissues caused by sun, hot liquids, fire, electricity or chemicals. Rapid cooling is the only intervention that can help. Remove the component and place it under a cold tap.

**CAUSE**

- Fire
- Hot liquids e.g. water, steam, soup
- Hot metallic objects
- Caustic chemical e.g. acid or alkali
- Electricity

**Symptoms**

- Pain that could be extremely severe
- If the patient has breathed in hot air or fumes, breathing might be difficult for him.
- Vomiting may occur
- It's possible that the patient is unconscious.

**What to do**

- Put out the fire and cool the burned area as soon as you can.
- Chemical burns require extensive cleaning. You can never do this too much.
- Avoid popping blisters.
- Applying grease, oil, medication, or anything else to a severe burn is not advised.
- Burns cause the blood to quickly lose fluid, which needs to be replaced.
- A burn results in the skin and occasionally deeper tissue being destroyed. There could be a deep or superficial burn.

**Pharmacological Treatment**

• Apply gentian violet, mercurochrome, or silver sulfadiazine to the exposed area and leave it open if the blisters have already broken.
• Vaseline gauze should be used if covering the wound is required (deep burns, circumferential burns, infected burns)
• Analgesics to relieve pain.

## BLEEDING & ITS MANAGEMENT

The management of severe bleeding comes first, followed by ensuring circulation and air supply. The management of external bleeding is straightforward, as evidenced here, whereas surgical intervention is necessary to address internal bleeding. Insufficient oxygen delivery to the brain occurs when there is insufficient blood. Under these circumstances, it is imperative that the injured individual be admitted to the hospital as soon as possible.

**Here is what to do**

- Keep the bleeding area under direct pressure
- Till you have time to reflect, use your hand
- Find something to use to create a pad.
- With an encircling tie, apply it firmly and secure it in place.
- To encourage the formation of a clot, try to elevate and rest the area that is bleeding.
- Verify that the bleeding isn't just soaking into the clothing.
- When applied correctly, direct pressure can virtually completely stop bleeding.

## FAINTING

This is a brief loss of consciousness brought on by a drop in blood pressure that deprives the brain of enough oxygen and glucose for fuel. Severe fear can cause fainting, which is more likely to happen when there is a decrease in blood volume, such as from prolonged diarrhoea or excessive perspiration.

Never raise a person who is fainting. Raise his/her feet, loose tighten clothes, and get help from a medical practitioner.

## CARDIOPULMONARY RESUSCITATION (CPR)

Chest compressions and artificial ventilation are the two main components of cardiopulmonary resuscitation (CPR), which is used to keep the heart pumping blood and oxygen flowing during cardiac arrest. Even though cardiac arrest patients have low survival rates and neurologic outcomes, improved survival and neurologic outcomes are achieved with early, appropriate resuscitation, which includes early defibrillation and appropriate post-cardiac arrest care.

### What to do

If someone is found to be pulseless and has lost consciousness, they should receive CPR right away.

CPR can be administered anywhere without specific equipment. Continuous Chest compressions with hands or mechanical devices are provided in certain hospitals and emergency medical services.

### Technique

Complete, standard CPR consists of the following three actions, which must be taken in that order:

- Chest compressions
- Airway
- Breathing

Compression-only CPR (COCPR) is advised for lay rescuers.

Positioning for CPR is as follows:

- The most convenient and efficient way to perform CPR is to lay the patient supine on a hard surface so that the sternum can be effectively compressed.
- It is generally less effective to perform CPR on a mattress or other soft material.
- In order to successfully apply body weight compressions to the patient's chest, the compression provider must be elevated above the patient to obtain enough leverage.

CPR is started in the following manner for an unconscious adult:

- Perform 30 compressions on chest
- Open the airway and check to see if the patient is breathing by performing the head-tilt-chin-lift manoeuvre.
- Check for a foreign body obstructing the patient's airway in their mouth before starting ventilations

## CHOKING

Choking may be defined as the severe difficulty in breathing because of a constricted or obstructed throat or a lack of air.

- Pointing to throat, hands crossed on throat (universal sign of choking)
- Gasping or coughing
- Signs of panic
- Difficulty speaking
- Red face that steadily turns blue
- Loss of consciousness

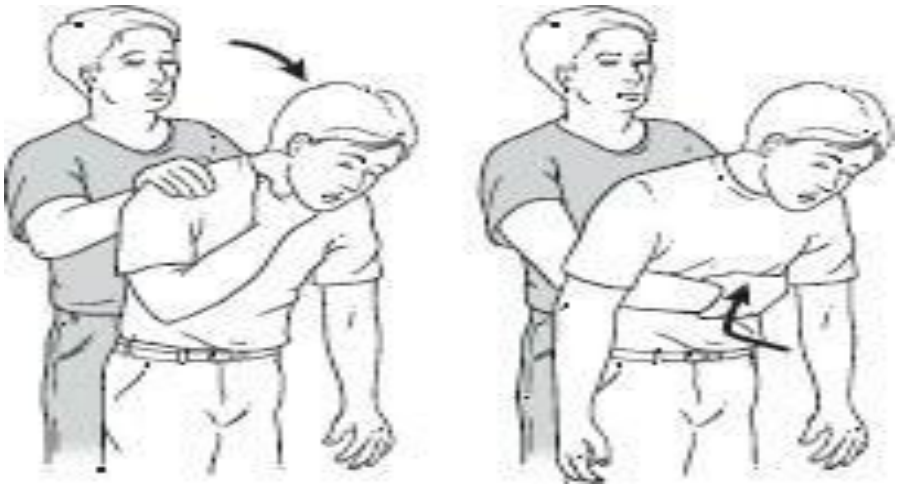
Turn the unconscious person over on his/her back. Loosen anything sticking out of the person's mouth or neck.

Start CPR if required.

**Heimlich Maneuver**

To execute the Heimlich manoeuvre on a person who is choking, follow these steps::

1. Place your arms around the person's waist from behind, tilt them slightly forward, and stand there.
2. One hand should be made into a fist and held just above the navel.
3. With your other hand, grasp your fist and press forcefully into the abdomen with quick, upward thrusts, as if you were attempting to lift the person up.
4. Pushing will continue until the foreign object is removed.



*Heimlich maneuver*

## MODULE -T

## POISONING AND ITS MANAGEMENT

Poisons are chemicals that have the ability to harm or even kill living things. Dose is very crucial because, when consumed in excess, even some medications and nutrients can become poisons.

Nearly all medications are safe when taken in prescribed manner but deadly when taken in excess. For instance, children may be poisoned by adult dosages.

First aid for poisoning does not exist. As soon as possible, get the victim to the hospital along with any and all evidence of the type of poisoning, such as empty bottles, syringes, vomit samples, tablets, and berry plants.

**Management of Phenol poisoning**

- Maintain Airway, Breathing, Circulation.
- Do not induce vomiting.
- Gastric lavage is contraindicated due to corrosive damage.
- Activated charcoal is not effective and may induce vomiting.
- Do not give neutralising chemicals as heat produced during neutralisation reactions may increase injury.
- Consider the use of water or milk (maximum initial volume = 100-200 mL in an adult; 2 mL/kg in a child) as diluents for symptomatic benefit early after corrosive ingestion provided the patient does not have swallowing or breathing problems.
- There is no specific antidote.
- Supportive and symptomatic management is the mainstay of treatment.
- Perform erect chest x-ray in all patients with symptoms.
- Treat haemorrhagic or hypovolaemic shock by replacing lost fluids and blood intravenously.
- Methaemoglobinaemia In symptomatic or cyanosed patients measure the methaemoglobin (MetHb) concentration urgently
- Antibiotics may be required if pneumonia or sepsis develops.
- Perform a 12-lead ECG in all patients who require assessment.

**Management of Naphthalene poisoning**

- Maintain clear airway and maintain adequate ventilation
- Gastric decontamination -

1. Lavage may be unsuccessful due to the size of the mothball
2. Consider activated charcoal (1g/kg for children; 50g for adults) if the patient presents within 1 hour of ingestion
3. Avoid fatty foods (enhance absorption)

- There is no specific antidote.
- Management of MetHb

1. Administer high flow oxygen
2. Give METHYLIONINIUM CHLORIDE (methylene blue) airway and maintain adequate ventilation.

## Management of Paracetamol Poisoning

- Maintain a clear airway and ensure adequate ventilation.
- Do not induce vomiting.
- Do gastric lavage
- Administer activated charcoal (1-2gm/kg body weight
- **Specific antidote- N-acetyl cysteine**
- Indications of N-acetyl cysteine

Suspected Paracetamol dose > 7.5gms or >150mg/kg of total dose 4 hour levels >150mcg/ml after acute ingestion.

Any evidence of liver injury (INR>1.3)( International normalised ratio)

- Monitor vital signs.
- **Dose of N-acetyl cysteine**

Loading dose(oral)- 140mg/kg as 5% solution (diluted in soft drink, juice or water). Maintenence dose (oral)- 70mg/kg every 4 hours for an additional 17 doses.

Loading dose(IV)- 150mg/kg infusion in 200ml of 5% dextrose over 60 minutes.

Maintenence dose(IV)- 50mg/kg infusion over 4 hour in 500ml dextrose followed by 100mg/kg infusion over 16 hours in 1000ml dextrose.

## Management of snake bite

**Do's**

1. Reassure & immobilize the patient.
2. Put a cotton bandage around the bitten limb which will slow spreading of venom through lymphatic system, taking care not to put it too tightly.
3. Immobilize the limb in the same way as a fractured limb
4. Rush the patient to the nearest health care facility.
5. Clean and dress the wound.
6. Give anti-tetanus prophylaxis as required. Prophylactic antibiotics are NOT required.

**Don'ts**

1. Do not apply tourniquet.
2. Cryotherapy, cutting, suction, and electrical have no proven value.
3. Withhold food & drinks

**When to administer Anti-snake venom (ASV) ?**

1. Administer only in patients with evidence of systemic envenoming (coagulopathy, neurotoxicity) including abdominal pain and vomiting.
2. Severe local envenoming (swelling involving more than half of the bitten limb in absence of a tourniquet.
3. Rapid extension of swelling within a few hours of bite.
4. Hypotension persisting for more than 10 minutes, with or without features of shock.
5. ECG abnormalities (bradycardia and widespread ischaemic changes

**Dose of ASV:**

1. Initial dose 8-10 vials (same in adults & children)
2. Reconstitute each vial of lyophilized ASV with sterile water (10ml). Do not shake.
3. Administer IV slowly (2ml/min.) OR give by IV infusion, (reconstitute or dilute liquid ASV

in 5-10ml/kg body weight of isotonic saline or glucose

4. Administer all ASV over 1 hr. at constant speed and monitor patient closely for 2 hrs.
5. Do not administer ASV on to or near the bite site.

**(No test dose to be given)**

**Repeat Dose of ASV:**

1. In neurotoxic envenomation, if the symptoms persist or have worsened after the initial dose of ASV and neostigmine test, administer a second dose after 1-2 hrs. same as the first dose and then discontinue ASV.
2. In hemotoxic envenomation, give first dose of ASV (8-10 vials) over 1 hr. After 6 hrs, give further dose of ASV over 1 hr in case of continued coagulation disturbance. Repeat doses of ASV should be continued every 6hrs until coagulation is restored.

**In case of ASV Reactions:**

1. Discontinue ASV and administer adrenaline (Adults: 0.5mg of 1:1000 adrenaline IM, Children: 0.01mg/kg, IM).
2. Give H1 antihistamine (pheniramine maleate), hydrocortisone and IV fluids.
3. Watch for 10-15 min, if the condition is worsening, give second dose of adrenaline which may be repeated for the third time
4. Restart ASV slowly (10-15min) under close observation. Once the patient has recovered, then resume the normal drip rate.

**Management of Benzodiazepines poisoning**

- Drugs- alprazolam, chlordiazepoxide, clonazepam, diazepam, lorazepam.
- Do not induce vomiting
- Do gastric lavage
- Administer activated charcoal (1-2gm/kg bodyweight)
- **Specific antidote- Flumazenil**
- Indications of Flumazenil- only in case of respiratory depression and/or coma
- **Dose of Flumazenil:**

**Adults-** 0.2mg IV over 30 seconds. If no response within 30 seconds, give further 0.3mg over 30 sec. If further no response, give 0.5mg at 1 minute interval up to a maximum of 3mg.

If partial response, may give up to 5mg.

**Children (>1 year)-** bolus dose of 0.01mg/kg; if no response, repeat dose at 60 sec. Intervals, up to a maximum total dose 0.05mg/kg or 1mg whichever is lesser.

## Management of Kerosene poisoning

- Maintain Airway, Breathing, Circulation.
- Do not induce vomiting.
- Gastric lavage is contraindicated due to risk of aspiration pneumonitis.
- Activated charcoal is not effective and may induce vomiting
- There is no specific antidote.
- Supportive and symptomatic management is the mainstay of treatment.
- Perform an erect chest x-ray in all patients, preferably 6-8 hours after exposure (or earlier if clinically indicated).
- All patients who require assessment should be observed for at least 8 hours after ingestion.
- Antibiotics may be required if pneumonia or sepsis develops.
- Perform a 12-lead ECG in all patients who require assessment.

## Management of Organophosphate Poisoning

(OP compounds-Chlorpyrifos, Diazinon, Dichlorvos, Monochrotophos, Malathion, Parathion)

(Sources- pesticides, nerve gases)

1. **Decontamination:**
   - Contaminated clothing should be removed
   - Thorough irrigation with water
2. **Stabilization:**
   - Check Airway, Breathing and Circulation
   - High flow oxygen/ intubation if needed
3. **Gastric Decontamination:**
   - Gastric lavage is not indicated however you may perform if the patient presents to you within 1 hour of exposure after performing endotracheal intubation and initiating therapy with atropine and an oxime.
   - Activated charcoal (AC) can be given to patients presenting within one hour of an organophosphorus agent or carbamate ingestion.

(The standard dose is 1 g/kg, maximum dose 50 g). **(should be administered only under the supervision of a registered medical practitioner )**

   - Forced vomiting is contraindicated because of the risk of aspiration and seizures.

4. **Treatment of Cholinergic toxicity – atropine: (should be administered only under the supervision of a registered medical practitioner )**
   - Initial dose- 2 to 5 mg IV for adults and 0.05 mg/kg IV for children.
   - If no effect is noted, the dose should be doubled every three to five minutes until clearing of respiratory secretions and the cessation of bronchoconstriction.
   - Tachycardia and mydriasis are not appropriate markers for therapeutic improvement.
   - In patients with severe poisoning, 100s of mg of atropine are used.
   - Maintenance dose- 10 to 20 percent of the total cumulative bolus dose as an IV continuous infusion per hour.
   - Since atropine does not bind to nicotinic receptors, it is ineffective in treating neuromuscular dysfunction.

5. **Treatment of Cholinergic toxicity – Pralidoxime: (should be administered only under the supervision of a registered medical practitioner)**

- Pralidoxime (2-PAM) -cholinesterase reactivating agent, effective in treating both muscarinic and nicotinic symptoms.
- Pralidoxime should not be administered without concurrent atropine.
- The current World Health Organization recommendation for IV bolus therapy with pralidoxime is at least 30 mg/kg in adults, and 25 to 50 mg/kg for children.
- Pralidoxime should be administered slowly over 30 minutes.
- Maintenance dose- infusion of 8mg/kg per hour in adults and 10 to 20 mg/kg per hour for children.

## Management of Pyrethroids poisoning

- Maintain Airway, Breathing, Circulation.
- Do not induce vomiting.
- Gastric Lavage – Avoid in case hydrocarbon base is present, due to risk of aspiration pneumonia.
- Activated Charcoal (Adults : 50g, Children : 1g/kg) – Indicated only in large ingestion with protected airway.
- Gastric aspiration with NG tube can be performed.
- Severe salivation may be treated with IV atropine.
- For seizures- Benzodiazepines, phenobarbital, propofol can be used.
- There is no specific antidote.
- Observation period (if asymptomatic) – At least 4-6 hours and follow-up if any symptoms occur.
- In case eye contact- Irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. If signs & symptoms persist after 15 minutes of irrigation, an ophthalmologic examination should be performed.

## Management of Scorpion stings

1. **First aid:**

- Reassure the patient and give paracetamol for pain.
- The patient, and particularly the envenomed limb, should be immobilised until the patient has been assessed in hospital.
- All stung patients should be rapidly transported to hospital, preferably in the recovery position.
- Maintain a clear airway and adequate ventilation in patients who are unconscious.
- Early anaphylaxis should be treated with adrenaline.
- Avoid interference with the sting site. Do not cut into or suck from the site, nor apply tourniquets, ligatures, or compression bandages.

2. Infiltration of the sting site with local anaesthetic or a regional nerve block may be required to relieve intense pain (this is the most useful intervention in many cases of scorpion sting).
3. Give tetanus prophylaxis as required.
4. Consider checking arterial blood gases in patients with severe envenoming.

5. All patients who require assessment should be observed for at least 4 hours after exposure. Asymptomatic patients can then be considered for discharge with advice to return if symptoms develop.
6. Perform a chest X-ray in patients with symptoms of pulmonary oedema.
7. Atropine is not recommended for cholinergic symptoms and signs as it may exacerbate adrenergic toxicity.

**Management of Aluminum Phosphide poisoning**

- Maintain a clear airway and ensure adequate ventilation.
- Administer oxygen to achieve adequate oxygenation.
- Monitor vital signs and cardiac rhythm; check the capillary blood glucose. Check and record pupil size.
- Consider the need for IV fluids and correct electrolyte abnormalities
- Do not induce vomiting.
- Dry decontamination should be considered as aluminium phosphide reacts with water or moisture to liberate phosphine gas.
- There is no specific antidote.
- Supportive and symptomatic management is the mainstay of treatment.
- **Management of Thyroxine poisoning**
- Maintain Airway, Breathing, Circulation.
- Do not induce vomiting.
- In case of large ingestion (>3mg): gastric lavage, activated charcoal(1-2g/kg)
- Based on requirement, can administer humidified oxygen.
- If required, ET intubation
- Order 12 lead ECG.
- Consider use of beta blocker in symptomatic patients:
- Propranolol (adult: oral-10-40mgTDS, IV-1mg over 1 min [upto 10mg]. Children: oral-250-500mcg/kg TDS, IV-25-50mcg/kg)
- There is no specific antidote.

**Management of opioids poisoning**

- Opioid drugs -tramadol, codeine, morphine, heroin, tapentadol, pentazocin.
- Do not induce vomiting.
- Do gastric lavage even if patient comes after two hours.
- Give activated charcoal (1-2gm/kg body weight)
- **Specific antidote- Naloxone**
- **Indications of Naloxone:**

For reversal of acute opioid intoxication presenting as coma, respiratory depression, or hypotension.

Empirical therapy for stupor or coma suspected to be caused by opioid overdose

- **Dose of naloxone:**

Adults: 0.4-2 mg IV. Repeat every 2-3 min up to a total dose of 10 mg. If clinical condition

does not improve even at 10 mg, reconsider the diagnosis.

In opioid dependant individuals, starting dose should be as low as 0.04 to 0.4 mg IV due to risk of opioid withdrawal

Children: (<12 yrs.): 0.1 mg/kg IV or IM, may repeat every 2-5 min till response occurs (Max. 2 mg in <5 yrs.). In case of chronic opioid exposure: 0.01 mg/kg IV or IM, if no response, may administer 0.1 mg/kg IV or IM.

- In case of ingestion of a long acting opioid, continuous infusion every hour may be given as two third of the effective bolus dose for initial reversal and titrated as required.
- Goal of naloxone administration is adequate ventilation and to improve level of Consciousness.

## Management of Rat kill/rodenticide poisoning

- **Zinc phosphide:**
  1. Do not induce vomiting.
  2. Role of gastric lavage is not clear.
  3. In case of large ingestion: Consider early gastric lavage with dilute potassium permanganate (1:10,000)/sodium bicarbonate(3 to5%). Administer activated charcoal (1-2 g/kg body weight).
  4. **There is no specific antidote**.
  5. Supportive and symptomatic management- treat hypotension, treat seizures, electrolyte imbalance if present.
- **Bromadiolone:**
  1. Do not induce vomiting.
  2. Do not do gastric lavage.
  3. In case of large ingestion: Administer activated charcoal (1-2 g/kg body weight)
  4. **Specific Antidote- Vitamin K1 (Phytonadione)**
  5. No active bleeding & INR < 4, post 48 hrs ingestion- No treatment required
  6. No active bleeding & INR > 4, post 48 hrs. ingestion - Give Vitamin K1,10 mg slow IV (children: 250 mcg/ kg IV Max 10mg); Alternatively Oral dose - Adults:15-25mg; Children: 5-10 mg, 2 to 4 times a day.
  7. Active bleeding or fife threatening haemorrhage - Give Vitamin K1 20 - 40 mg slow IV diluted in saline or glucose, (rate not exceeding 5% of the total dose/min.) with further dosing guided by INR monitoring.
  8. Switch to oral dosing once patient has stabilized. Oral daily maintenance doses of 500 to 1000 mg have been required.
  9. Vitamin K1 may be required for weeks or months.
  10. Monitor INR. 2 weeks after stopping Vitamin K1 to ensure no recurrence of anticoagulation.
- **Barium carbonate:**
  1. Do not induce vomiting.
  2. In case of large ingestion: Consider gastric lavage oraspiration with a nasogastric tube.
     Give magnesium sulphate or sodium sulphate (adult: 30 g: children: 250 mg/kg)as a 5% solution by stomach tube to precipitate barium sulphate.
  3. Administer sufficient IV fluids to maintain brisk urine output.
  4. Treat hypokalemia with IV potassium chloride (up to 250 mEq administered over 24 hrs. Can be used. High doses of 420 mEq over 24 hrs. Can also be used)
  5. **There is no specific antidote.**

## MODULE –U

## CHILD'S IMMUNIZATION SCHEDULE

Immunization is an important and effective health intervention for children. Over the course of history, it has helped keep millions of children protected against infectious and life-threatening diseases.

Vaccines have been so effective that some diseases that were once feared are now either eradicated or easily manageable. Yet, in the recent past many new diseases are emerging too. This makes immunization of a child even more important.

Vaccines are most effective when they are administered to children at the right age and with the recommended dosage as children are susceptible to certain diseases at certain ages. As an example, polio occurs most frequently in children below the age of 5. Because of this, polio vaccines are given to children of those ages to prevent harm caused by the disease. A child who isn't vaccinated or isn't vaccinated on time remains unprotected and has increased chances of getting seriously ill.

### AT BIRTH

### BACILLUS CALMETTE GUERIN (BCG)

- This is a single dose vaccine.
- Administered via injection on upper arm
- This vaccine offers protection against tuberculosis.
- Potential side effects of this vaccine include:

    - Soreness or discharge where the injection was given
    - High temperature
    - Headache
    - Swollen glands under the armpit on the arm that received the vaccine shot

## ORAL POLIO VACCINE (OPV) – 0 DOSE

- This is the first dose taken at birth. The next dose is taken when your child is 6 weeks old, the third dose at 10 weeks old, and the last dose at 14 weeks old.
- Administered orally
- This vaccine protects against the poliovirus which is a highly infectious disease that invades the nervous system and can lead to total paralysis. The virus primarily affects children 5 years and below.
- Potential side effects of this vaccine include:
    - There are no common side effects associated with this vaccine.

## HEPATITIS B BIRTH DOSE

- This is a single dose vaccine.
- Administered via injection
- This vaccine protects against Hepatitis B which is a viral infection that attacks the liver and can cause both acute and chronic disease.
- Potential side effects of this vaccine include:

    - Other than some redness and soreness where the injection was given, side effects are rare.
    - It's an inactivated (dead) vaccine, so it cannot cause the infection itself

**6 WEEKS**

## ORAL POLIO VACCINE (OPV) - 1

- This is the second OPV dose taken at 6 weeks. The next dose is taken when your child is is 10 weeks old, and the last dose at 14 weeks old.
- Administered orally

- This vaccine protects against the poliovirus which is a highly infectious disease that invades the nervous system and can lead to total paralysis. The virus primarily affects children 5 years and below.
- Potential side effects of this vaccine include:

    - There are no common side effects associated with this vaccine.

**PENTAVALENT - 1**

- This is the first dose taken at 6 weeks old. The next dose is taken when your child is 10 weeks old and the last dose at 14 weeks old.
- Administered via injection
- This vaccine offers protection against Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib.
- Potential side effects of this vaccine include:

    - Swelling, redness and pain may occur at the site where the injection is given.
    - Children may develop fever for a short time after immunization.
    - Symptoms usually appear the day after vaccination and last between 1-3 days.

**ROTAVIRUS VACCINE (RVV) - 1**

- This is the first dose of three doses. The second dose is taken when your child is 10 weeks old and the last dose at 14 weeks old.
- Administered orally
- This vaccine offers protection against rotaviruses which are the most common cause of severe diarrhoeal disease in infants and young children.
- Potential side effects of this vaccine include:

    - Side effects are rare and mild
    - May include diarrhoea, vomiting and irritation

## PNEUMOCOCCAL CONJUGATE VACCINE (PCV) - 1*

- The first of two doses of the PCV. The second dose is taken when your child is 14 weeks old.
- Administered via injection
- This vaccine offers protection against meningitis, septicaemia and pneumonia to milder infections such as sinusitis and otitis media.
- Potential side effects of this vaccine include:

    - Redness
    - Swelling
    - Pain or tenderness
    - Fever
    - Loss of appetite
    - Fussiness (irritability)
    - Feeling tired
    - Headache
    - Muscle aches or joint pain
    - Chills

## INACTIVATED POLIO VACCINE (FIPV) - 1

- The first of two doses of the fIPV. The second dose is given to your child at 14 weeks.
- Administered via injection
- This vaccine offers protection from the poliovirus which is a highly infectious viral disease that largely affects children under 5 years of age.
- Potential side effects of this vaccine include:

    - Soreness
    - Fever

**10 WEEKS**

**PENTAVALENT - 2**

- The second dose is taken when your child is 10 weeks old and the last dose at 14 weeks old.
- Administered via injection
- This vaccine offers protection against Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib.
- Potential side effects of this vaccine include:

    - Swelling, redness and pain may occur at the site where the injection is given.
    - Children may develop fever for a short time after immunization.
    - Symptoms usually appear the day after vaccination and last between 1-3 days.

**ORAL POLIO VACCINE (OPV) - 2**

- This is the third OPV dose taken when your child is 10 weeks old. The last dose is taken when the child is 14 weeks old.
- Administered orally
- This vaccine protects against the poliovirus which is a highly infectious disease that invades the nervous system and can lead to total paralysis. The virus primarily affects children 5 years and below.
- Potential side effects of this vaccine include:

    - There are no common side effects associated with this vaccine.

**ROTAVIRUS VACCINE (RVV) - 2**

- The second dose is taken when your child is 10 weeks old and the last dose at 14 weeks old.
- Administered via injection
- Administered orally

- This vaccine offers protection against rotaviruses which are the most common cause of severe diarrhoeal disease in infants and young children.
- Potential side effects of this vaccine include:

    - Side effects are rare and mild
    - May include diarrhea, vomiting and irritation

## 14 WEEKS

### PENTAVALENT - 3

- This is the last Pentavalent vaccine dose to be taken at 14 weeks old.
- Administered via injection
- This vaccine offers protection against Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib.
- Potential side effects of this vaccine include:

    - Swelling, redness and pain may occur at the site where the injection is given.
    - Children may develop fever for a short time after immunization.
    - Symptoms usually appear the day after vaccination and last between 1-3 days.

### ORAL POLIO VACCINE (OPV) - 3

- This is the last OPV dose is taken when your child Is 14 weeks old.
- Administered orally
- This vaccine protects against the poliovirus which is a highly infectious disease that invades the nervous system and can lead to total paralysis. The virus primarily affects children 5 years and below.
- Potential side effects of this vaccine include:

    - There are no common side effects associated with this vaccine.

## ROTAVIRUS VACCINE (RVV) - 3

- This is the last RVV dose is taken when your child Is 14 weeks old.
- Administered via injection
- Administered orally
- This vaccine offers protection against rotaviruses which are the most common cause of severe diarrhoeal disease in infants and young children.
- Potential side effects of this vaccine include:

    - Side effects are rare and mild
    - May include diarrhea, vomiting and irritation

## PNEUMOCOCCAL CONJUGATE VACCINE (PCV) - 2

- The second of two doses of the PCV given at 14 weeks old.
- Administered via injection
- This vaccine offers protection from meningitis, septicaemia and pneumonia to milder infections such as sinusitis and otitis media.
- Potential side effects of this vaccine include:

    - Redness
    - Swelling
    - Pain or tenderness
    - Fever
    - Loss of appetite
    - Fussiness (irritability)
    - Feeling tired
    - Headache
    - Muscle aches or joint pain
    - Chills

**INACTIVATED POLIO VACCINE (FIPV) - 2**

- The final fIPV dose is given to your child at 14 weeks.
- Administered via injection
- This vaccine offers protection from the poliovirus which is a highly infectious viral disease that largely affects children under 5 years of age.
- Potential side effects of this vaccine include:

    - Soreness
    - Fever

**9-12 MONTHS**

**MEASLES & RUBELLA (MR) - 1**

- The first of two doses of the MR vaccine. The second dose is administered between 16-24 months old.
- Administered via injection
- This vaccine offers protection against measles and rubella. Measles is often a severe disease, frequently complicated by middle-ear infection or bronchopneumonia. Rubella causes a mild exanthematous illness, along with few constitutional symptoms, and occurs most commonly in childhood.
- Potential side effects of this vaccine include:

    - Redness, swelling and sore feeling for 2 to 3 days
    - Around 7 to 11 days after the injection, babies or young children may feel a bit unwell or develop a high temperature for about 2 or 3 days

## JAPANESE ENCEPHALITIS (JE-1) **

- The first of two doses of the JE-1 vaccine. The second dose is given to your child between 16-24 months.
- Administered via injection
- This vaccine offers protection against Japanese Encephalitis which is the main cause of viral encephalitis in Asia. Most infections are mild or without apparent symptoms other than fever and a headache. However, sometimes it can result in severe clinical illness.
- Potential side effects of this vaccine include:

    - Fever though rarely (more often in children).
    - Headache or muscle aches mainly in adults.
    - Pain, tenderness, redness, or swelling around the vaccine shot.

## PNEUMOCOCCAL CONJUGATE VACCINE - BOOSTER*

- This is a single dose vaccine.
- Administered via injection
- The vaccine offers protection against pneumonia, ear infections, sinus infections, meningitis, bacteremia.
- Potential side effects of this vaccine include:

    - Redness/swelling
    - Loss of appetite
    - Irritability
    - Fever
    - Increased crying

**16-24 MONTHS**

**MEASLES & RUBELLA (MR) - 2**

- The second of two doses of the MR vaccine to be taken by your child between 16-24 months.
- Administered via injection
- The vaccine offers protection against measles and rubella. Measles is an almost invariable clinical experience of childhood, and is often a severe disease, frequently complicated by middle-ear infection or bronchopneumonia. Rubella (German measles) gives rise to a mild exanthematous illness, accompanied by few constitutional symptoms, and occurs most commonly in childhood.
- Potential side effects of this vaccine include:

    - The area where the needle goes in looking red, swollen and feeling sore for 2 to 3 days
    - Around 7 to 11 days after the injection, babies or young children may feel a bit unwell or develop a high temperature for about 2 or 3 days

**JAPANESE ENCEPHALITIS (JE-2) ****

- The final JE vaccine to be administered between 16-24 months.
- Administered via injection
- This vaccine offers protection against Japanese Encephalitis which is the main cause of viral encephalitis in Asia. Most infections are mild or without apparent symptoms other than fever and a headache. However, sometimes it can result in severe clinical illness.
- Potential side effects of this vaccine include:

    - Fever though rarely (more often in children).

- Headache or muscle aches mainly in adults.
- Pain, tenderness, redness, or swelling around the area of the vaccine shot.

**DIPHTHERIA PERTUSSIS & TETANUS (DPT) - BOOSTER 1**

- The first of two doses of the DPT vaccine. The second dose is given to your child between 5-6 years old.
- Administered via injection
- The vaccine offers protection from diphtheria, pertussis, and tetanus.
- Potential side effects of this vaccine include:

    - Soreness or swelling around the area of the vaccine shot.
    - Fever
    - Irritation
    - Exhaustion
    - Loss of appetite
    - Vomiting

**ORAL POLIO VACCINE – BOOSTER**

- This is a single dose vaccine.
- Administered orally
- This vaccine protects against the poliovirus which is a highly infectious disease that invades the nervous system and can lead to total paralysis. The virus primarily affects children 5 years and below.
- Potential side effects of this vaccine include:

    - There are no common side effects associated with this vaccine.

**5-6 YEARS**

**DIPHTHERIA PERTUSSIS & TETANUS (DPT) - BOOSTER 2**

- The second of two doses, DPT vaccine is to be given to your child when they are 5-6 years old.
- Administered via injection
- The vaccine offers protection from diphtheria, pertussis, and tetanus
- Potential side effects of this vaccine include:

    - Soreness or swelling around the area of the vaccine shot.
    - Fever
    - Irritation
    - Exhaustion
    - Loss of appetite
    - Vomiting

**10 YEARS**

**TETANUS & ADULT DIPHTHERIA (TD)**

- This is a single dose vaccine.
- Administered via injection
- The vaccine provides protection against tetanus which can be contracted through infected cuts or wounds with the spores of the bacterium Clostridium tetani. Diphtheria can lead to difficulty breathing, heart failure, paralysis, or death. Most cases occur within 14 days of infection.
- Potential side effects of this vaccine include:

    - Pain
    - Redness or swelling around the area of the vaccine shot
    - Mild fever
    - Headache

- Exhaustion
- Nausea, vomiting, diarrhea, or stomachache

**16 YEARS**

**TETANUS & ADULT DIPHTHERIA (TD)**

- This is a single dose vaccine.
- Administered via injection
- The vaccine provides protection against tetanus which can be contracted through infected cuts or wounds with the spores of the bacterium Clostridium tetani. Diphtheria can lead to difficulty breathing, heart failure, paralysis, or death. Most cases occur within 14 days of infection.
- Potential side effects of this vaccine include:

  - Pain
  - Redness or swelling around the area of the vaccine shot
  - Mild fever
  - Headache
  - Exhaustion
  - Nausea, vomiting, diarrhoea, or stomachache

## National Immunization Schedule (NIS) for Infants, Children and Pregnant Women

| Vaccine | When to give | Dose | Route | Site |
|---|---|---|---|---|
| **For Pregnant Women** | | | | |
| **TT-1** | Early in pregnancy | 0.5 ml | Intra-muscular | Upper Arm |
| **TT-2** | 4 weeks after TT-1* | 0.5 ml | Intra-muscular | Upper Arm |
| **TT- Booster** | If received 2 TT doses in a pregnancy within the last 3 yrs* | 0.5 ml | Intra-muscular | Upper Arm |
| **For Infants** | | | | |
| **BCG** | At birth or as early as possible till one year of age | 0.1ml (0.05ml until 1 month age) | Intra-dermal | Left Upper Arm |
| **Hepatitis B - Birth dose** | At birth or as early as possible within 24 hours | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| **OPV-0** | At birth or as early as possible within the first 15 days | 2 drops | Oral | Oral |
| **OPV 1, 2 & 3** | At 6 weeks, 10 weeks & 14 weeks (OPV can be given till 5 years of age) | 2 drops | Oral | Oral |
| **Pentavalent 1, 2 & 3** | At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age) | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| **Rotavirus#** | At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age) | 5 drops | Oral | Oral |
| **IPV** | Two fractional dose at 6 and 14 weeks of age | 0.1 ml | Intra dermal two fractional dose | Intra-dermal: Right upper arm |
| **Measles /MR 1st Dose$** | 9 completed months-12 months. (can be given till 5 years of age) | 0.5 ml | Sub-cutaneous | Right upper Arm |
| **JE - 1**** | 9 completed months-12 months. | 0.5 ml | Sub-cutaneous | Left upper Arm |
| **Vitamin A (1st dose)** | At 9 completed months with measles-Rubella | 1 ml ( 1 lakh IU) | Oral | Oral |
| **For Children** | | | | |
| **DPT booster-1** | 16-24 months | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| **Measles/ MR 2nd dose $** | 16-24 months | 0.5 ml | Sub-cutaneous | Right upper Arm |
| **OPV Booster** | 16-24 months | 2 drops | Oral | Oral |
| **JE-2** | 16-24 months | 0.5 ml | Sub-cutaneous | Left Upper Arm |
| **Vitamin A*** (2nd to 9th dose)** | 16-18 months. Then one dose every 6 months up to the age of 5 years. | 2 ml (2 lakh IU) | Oral | Oral |
| **DPT Booster-2** | 5-6 years | 0.5 ml. | Intra-muscular | Upper Arm |
| **TT** | 10 years & 16 years | 0.5 ml | Intra-muscular | Upper Arm |

- *Give TT-2 or Booster doses before 36 weeks of pregnancy. However, give these even if more than 36 weeks have passed. Give TT to a woman in labour, if she has not previously received TT.
- **JE Vaccine is introduced in select endemic districts after the campaign.
- *** The 2nd to 9th doses of Vitamin A can be administered to children 1-5 years old during biannual rounds, in collaboration with ICDS.
- #Phased introduction, at present in Andhra Pradesh, Haryana, Himachal Pradesh and Orissa from 2016 & expanded in Madhya Pradesh, Assam, Rajasthan, and Tripura in February 2017 and planned in Tamil Nadu & Uttar Pradesh in 2017.
- $ Phased introduction, at present in five states namely Karnataka, Tamil Nadu, Goa, Lakshadweep and Puducherry. (As of Feb' 2017)

## MODULE -V

## DUTIES OF PHARMACIST

**(As per G.O 9/5-8-90-Seven-4/89, Dated on 22/01/1990, Government of Uttar Pradesh)**

1. Pharmacist will dispense the prescription. in case of any obvious error in the prescription due to any omission, incompatibility or over doses the prescription should be referred back the prescriber for correction or approval of change suggested.

2. Repetition of dispensing for the same patient's even prescribed by the different prescriber shall not be dispensed if the prescription is separate.

3. He shall compound mixture and dispense any medicine/drugs to the ward and OFD.

4. He shall be responsible for administration of parental preparations.

5. He shall be incharge of stores of medicines/drugs/surgical dressing and injection. etc.

6. Proper stocking, storare of medicines, surgical, dressings and verification of bills of medicines and other articles and will report the shortage, if any.

7. Maintance of stock book and other record pertaining to the medicines, dead stock, consumable articles, Linen & surgical dressing-

8. He will maintain expiry date register and inform the Med. Entities about medicines/injections likely to expire in next s months to ensure their proper utilisation.

9. He will ensure the availability of life Saving drugs at all the sizes in store including antidotes & poisions, antisnake venón serum etc.

10. He will help the Chief Pharmacist/Pratheri Adhikari Pharmacy/Medical Officer Incharge/Superintendent/Dy.CMO/Sr.supdt:/CMO in verification of stores as the case may be.

11. Stocking of poisonous drugs under lock and key.

12. The pharmacist hold charge of of current duties, of Medical Officer Incharge of a dispensary/hospital when the latter is absent cither on duty or regular leave from his post.

13. He must be present at the dispensary/hospital/PHC at the prescribed hours of the attendance ad emergency duty hours when ordered otherwise he should be available at his residence when on call.

14. He will assist the operation cases.

15. He shall be responsible for sterilisation of syringes/instruments/ dressings and other equipment's.

16. He will assist and carry out the instructions of the E. Medical Officer on duty.

- Examination and treatment of emergency cases.
- Stitching, dressing, of wounds and dispensing of medicines.
- He shall help and give direction to other para medical staff while stomach wash is being done in poisoning cases.
- Medico Legal, examination, and treatment.

17. Writing of diet registers. and other register/vouchers if no steward/dietician posted and to help the Medical Officer Incharge/Chief Pharmacist in its working.

18. He shall put forward any suggestion, he may desire for improvement of the department under his charge to the Superintendent/Sr. Medical Supat./Dy.CMO/CMO through Chief Pharmacist/Medical Officer Incharge.

19. Where no nursing staff is posted as in allopathic dispensaries & PHC, they will see the welfare of patients, give medicines, dress the wounds, take body temperature and carryout instructions given on bed head ticket of the patients by the doctor.

20. Pharmacist will be incharge of the institution (Hospitals/ Dispensaries/PHC etc.) in absence of Medical Officer.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