NAME:

SESSION:

ANNUAL EXAM REGISTRATION NO:

I certify that this is the bonafide record of work done by the above named student during the practical pharmacology sessions in the laboratories of the Department of Pharmacology, JIPMER, Puducherry.

Date:

Head of the Department

Puducherry

Signature of Examiners:

1.

2.

Date:
A. GENERAL OBJECTIVES OF THE COURSE

B. GENERAL PHARMACOLOGY

<table>
<thead>
<tr>
<th>No</th>
<th>Name of Experiment</th>
<th>Page No.</th>
<th>Date</th>
<th>WkBk</th>
<th>Subm</th>
<th>Sign</th>
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<td>6</td>
<td>Prescription writing – Basic concepts</td>
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<td>Data collection and presentation</td>
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C. EXPERIMENTAL PHARMACOLOGY

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<th>Date</th>
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<th>Sign</th>
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### D. CLINICAL PHARMACOLOGY

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<th>Date</th>
<th>WkBk</th>
<th>Subm</th>
<th>Sign</th>
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### E. PRESCRIPTION WRITING AND PROBLEM SOLVING

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<th>No</th>
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<th>Date</th>
<th>WkBk</th>
<th>Subm</th>
<th>Sign</th>
<th>Marks</th>
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Abbreviation: WkBK - Workbook, Subm – Submission, Sign- Signature
ANNEXURES

Annexure 1: Definition of important drug formulations
Annexure 2: Accepted abbreviations for writing prescription
Annexure 3: ADR Reporting Form
Annexure 4: Causality Assessment – Scales and case scenario
Annexure 5: Sample form for informed consent
Annexure 6: Selecting a statistical test
Annexure 7: Sample form for therapeutic drug monitoring
Annexure 8: Drug Regulatory Act and Schedules
GENERAL OBJECTIVES OF THE COURSE

At the end of the practical training in general, experimental and clinical pharmacology the learner shall be able to:

1) Select and prescribe drug(s) rationally, in a legible manner, using appropriate format and terms, based on suitability, tolerability, efficacy and cost of medicines for common ailments and all National Health Programmes

2) List the various dosage forms and enumerate their advantages and disadvantages. Choose the most appropriate formulation for the clinical condition.

3) Recognize and report adverse drug events to Pharmacovigilance Center, using approved ADR forms

4) Foresee, prevent and manage common drug interactions.

5) Effectively communicate with patients and their relatives about the proper use of medication devices, storage of medicines etc.

6) Retrieve drug information from appropriate sources.

7) Critically appraise the drug advertisements.

8) Appreciate the role of good laboratory practice in promotion of rational therapy and experimentation.

9) Realize the cardinal role of ethics in experimentation.

10) Advice and interpret the therapeutic monitoring reports of important drugs

11) Appreciate the importance of essential medicines lists in helping the planner, provider, prescriber and the patient.

12) Advise appropriate pharmacotherapy for some common poisons.

13) Use antimicrobials prudently for therapy and prophylaxis.

14) Plan and carry out experiments to demonstrate the effect of drugs in experimental animals.

15) Present the experimental data in a tabular form and analyze it using basic statistical tests
INTRODUCTION TO PRACTICAL PHARMACOLOGY & SOURCES OF DRUGS

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. List the various sources of some common drugs and identify them.
2. Define the various terms relating to the science of pharmacology such as pharmacy, toxicology, therapeutics, clinical pharmacology, ethnopharmacology etc.,
3. Be familiar with the layout of the dept. of pharmacology, the various laboratories, animal room, staff and faculty.

You will be taken round the department to all the laboratories and the departmental animal room. Note down the names of the specimens displayed, the drug obtained from it, the use of the drug and the type of source (plant/mineral/animal etc)
ORAL AND PARENTERAL DOSAGE FORMS

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. List the common dosage forms pertaining to the oral and parenteral routes of administration.
2. Instruct patients on the correct method of using these common dosage forms
3. Explain to patients the precautions to be taken during use of these dosage forms.

Write down the dosage form and the generic name of the drug displayed at the various stations. Note the instructions to be given to patients on the proper usage of each dosage form. Write one important advantage of each dosage form.

Note: Definitions of dosage forms are given in Annexure - 1

Station No. 1. Tablets - sugar coated, dispersible, sustained release, enteric coated, sublingual tablets

Station No. 2. Capsules - soft /hard gelatin capsules, spansules

Station No. 3. Liquid oral formulations (mixtures) - syrups, mixtures, solutions, reconstituted oral solutions, elixirs, gels, emulsions, suspensions.

Station No. 4. Use of a vaginal tablet, rectal dosage forms (enema, suppository, tablet)

Station No. 5. Parenteral dosage forms - I.V.fluids, injections in ampoules/vials

Station No. 6. Eye, ear / nasal drops
TOPICAL DOSAGE FORMS & DEVICES

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. List the common dosage forms pertaining to the various topical routes of administration.
2. Instruct patients on the correct method of using the common dosage forms.
3. Understand the pharmacology behind the selection of these formulations for particular therapeutic indications.
4. Identify and list the parts of drug dispensing devices and give instructions to patients on the correct use of the same.

Write down the dosage form and the name of the drugs displayed at the various stations. Note the instructions to be given to patients on the proper usage of each dosage form/dispensing device.

Station No. 1.  Aerosols - inhaler, spacer, nebulizer, spinhaler

Station No. 2.  Transdermal drug delivery systems (TDS), implants

Station No. 3.  Dosage forms for topical use – powders, ointments, creams, paste, emulsion, liniment, paints
PARENTERAL DRUG ADMINISTRATION

OBJECTIVES:

At the end of the practical group work the student shall be able to:
1. Understand the various routes of parenteral drug administration and its application in clinical practice.
2. Follow aseptic techniques in handling a syringe and practice universal safety precautions.
3. Measure the required volume of a drug in a syringe and administer drugs through subcutaneous, intradermal, intramuscular and intravenous routes.

PROCEEDINGS:

There will be 3 stations numbered 1-3 with different tasks (1-3) at each station. Each batch will be divided into 3 groups and will be required to spend 25 minutes at each station. At each station complete the allotted task in the prescribed time.

At the end of the session discuss with the instructors.

Station No. 1 – Handling a syringe.
Task: Load the following volumes of the drug from the vial with the appropriate syringes following aseptic techniques:
   a. 0.2 ml
   b. 1.5 ml
   c. 4.5 ml
   d. 7.0 ml

COMPONENTS OF TASK

- Choose the appropriate syringe for the volume
- Choose the appropriate gauge needle for the desired route
- Aseptic technique while opening the packet/handling the syringe
- Loading the syringe with aseptic technique

Station No. 2 – Subcutaneous, intradermal and intramuscular route.
Task: a. Inject 0.4 ml of the given drug into the animal provided (subcutaneous)
   b. Inject 0.2ml of the given drug into the provided model (intradermal)
   c. Inject 1ml of the given drug into the provided model (intramuscular)

COMPONENTS OF TASK

- Select the site
- Clean the site
- Injection technique for the required route.
- Universal safety precautions

Station No. 3 – Intravenous injection of drug, withdrawal of fluid, and setting up an IV line and fixation, inserting an intravenous cannula
Task: a. Inject 3ml of the given drug intravenously into the given hand model as
   i. Rapid iv
   ii. Slow iv over 2 minutes
   b. Withdraw 1ml of fluid from the given hand model.
   c. Start an iv line in the given hand model, secure it and set up an intravenous drip.
COMPONENTS OF TASK
- Parts of the I.V. infusion apparatus
- Aseptic techniques when opening infusion set
- Positioning of the patient, selection of vein
- Skin preparation
- Injection technique and confirmation of position
- Strapping the needle in place
- I.V.fluids to be checked for impurities
- Adjusting flow rate
- Checking drug name, date of expiry, patient ID,
- Monitoring the patient

All groups to note - Volumes (in ml) of teaspoon, tablespoon, ounce which will be kept on display.

Questions
1. List two drugs which are given in the following routes of administration
   a. intradermal injections
   b. subcutaneous injections
   c. intramuscular injections
   d. intravenous route :  i. injections        ii. infusion pumps

2. What is patient controlled analgesia?

3. List the advantage of pen devices. Give examples.

4. Write complications involved in intravenous injections for patients.

5. Write briefly about universal safety precautions in giving injections.
GOOD LABORATORY PRACTICE (GLP)

Introduction:

The Organization for Economic Co-operation and Development (OECD), Paris, France defines GLP as

"Good Laboratory Practice (GLP) is a quality system concerned with the organizational process and the conditions under which non-clinical health and environmental safety studies are planned, performed, monitored, recorded, archived and reported."

Some countries require GLP certificate for laboratories or research workers to continue with their studies. GLP promotes the development of acceptable quality test data. In three words GLP prevents from--Rework, Rejection and Deviation.

Objectives:

1. Understand the concept and components of GLP.
2. Learn the concept of testing the items for research-(mostly toxic chemicals, may be synthetic or natural and in some circumstances living organisms including microbes) to obtain data with respect to their properties and effect on human health and environment by using principles of GLP.
3. Learn the organization of GLP.
4. Learn to frame Standard Operating Procedure (SOP)
5. Acquire basic skills to work in a laboratory.
6. Learn advantages and disadvantages of GLP.

The fundamental points of GLP:

GLP stresses the importance of following main points,

- **Resources**: Organization, personnel, facilities, equipment
- **Rules**: Protocols, standard operating procedures, concept of the study Director as the pivotal point of study control
- **Characterization**: Test items, test systems
- **Documentation**: Raw data, final report, archives
- **Quality assurance**: Independence from study conduct

Organization for GLP in an individual study:

- Management
- Study Director
- Quality Assurance Unit--Quality assurance personnel
- Skilled laboratory workers
Standard Operating Procedure (SOP):

All “how to do?” Procedures in laboratories are documented as “Standard Operating Procedures” for simplicity at the hour of performing the experiment.

SOP helps us to achieve following:

1. **Standardized, consistent procedures.**
2. **An opportunity to optimize processes.**
3. **Technical and administrative improvements.**
4. **Ease of documenting complicated techniques.**

**Definition**

*SOPs are defined by ICH as “detailed, written instructions to achieve uniformity of the performance of a specific function.”*

- **Source**
- **Who writes it?**
- **Language**
- **Maintenance of SOP**
- **Location of SOP**
- **Importance of SOP**

**Advantages of GLP:**

- Studies are better controlled.
- Produces better results.
- More acceptable results to the authorities.
- Prevents rework, rejection, deviation for/of/from the study.

**Disadvantages of GLP:**

- Freedom is lost.
- Hampers creativity.
- Proliferation of documentation.
- Cost of the project rises by 5-20%.
GROUP TASKS

Group 1. Prepare an SOP for application of eye drops in a patient.

Group 2. Prepare an SOP for the measurement of blood pressure in upper limb of a human volunteer.

Group 3. Prepare an SOP for using Metered Dose Inhaler with spacer device in an asthmatic patient.

Group 4. Prepare an SOP for establishing an i.v. line in a patient and start administering normal saline.

QUESTIONS

1. What are the advantages and disadvantages for GLP?

2. Enlist the ways for quality assurance in an individual study.

Role play

Five or six students will perform a role play to highlight the importance of a code of conduct in the laboratory. The role play will focus on the rules which are usually broken by students, for e.g. not wearing aprons, teasing animals, lifting mice by tails and walking up and down, dropping animals, rinsing syringes onto the floor, discarding excess drug from dropper onto the table, cooking up data, copying from senior’s record etc.
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<thead>
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<td>Management</td>
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<td>Recalling and updating</td>
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<td>Controls and acceptance</td>
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<td>Safety aspects</td>
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| **Apparatus, Material, and**    | **Storage and Retention of**  |
| **Reagents:**                   | **Records and Materials:**    |
| Maintenance programme          | Archiving: General considerations|
| Calibration                     | Test and reference items      |
| Failure                         | Electronic versus hard copy   |
| Labeling requirements           | Access                        |
| Identification and storage      |                              |

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PRESCRIPTION WRITING – BASIC CONCEPTS

OBJECTIVES:

At the end of this session a student should be able to:

1. Identify the parts of a prescription and realize the importance of each.
2. Write a prescription in the correct format.
3. Understand the medico-legal importance of a prescription

1. A faculty member introduces the parts of a prescription and discusses the importance of each.

2. Group tasks will be distributed. About twenty minutes will be allocated for the group tasks. At the end a plenary session will be held for one and a half hours where different groups will present their findings.

Note: The accepted latin abbreviations used in prescriptions are given in Annexure - 2.

GROUP TASKS

Group No.1
What is the volume (in ml) of one teaspoonful, one tablespoonful and one ounce?

Group No.2
Write a prescription for a simulated case given by the teacher (refer text-book if necessary). What should be the main considerations in choosing a particular drug for a patient/disorder?

Group No.3
Criticize the given prescription under the following:
   (a) Format
   (b) Use of stationery supplied by a drug store

Group No.4
Criticize the given prescription under the following:
   (a) Type of prescription errors
   (b) What information (advice) should accompany the prescription?

Group No.5
Prepare a prescription format which may be more acceptable to Indian conditions. What modifications would you make on the existing format and why?

Group No. 6
What dispensing errors may happen when prescribing by brand names and why?
What are the advantages of "generic" prescribing?

Resources:

1. British National Formulary, British Medical association and Royal Pharmaceutical society of Great Britain
2. Text books of pharmacology- Katzung, Bennet and Brown, Goodman Gilman
CALCULATION OF DRUG DOSAGE AND PERCENTAGE SOLUTIONS

OBJECTIVES:

At the end of the session the student shall be able to:

1. Calculate the quantity of drug present in a given solution.
2. Appreciate the importance of calculating the total quantity of drug and its conversion from percentage and molar solutions for individualization of therapy.

Introduction - 20 mins covering rules of conversion, percentage solutions, molar solutions, milli equivalents etc., and the importance of calculating the total quantity of drug in percentage solutions. Eight problems will be given. They will be done as individual tasks. All students will be expected to work out the problems on an individual basis. Work books will be corrected by the instructor.

INDIVIDUAL TASKS

1. How much noradrenaline (in mg) is there in 4 ml of a 1:1000 solution?
2. How many mg of lignocaine are there in a 10 ml ampoule of lignocaine 1%?
3. How many mmol of sodium bicarbonate are there in 100 ml of an 8.4% solution?
4. How many mg adrenaline are there in a 10 ml ampoule of adrenaline in a 1:200,000 solution?
5. How many ml of a 1:10,000 solution would you need to obtain 1 mg of adrenaline?
6. How many tablets of (a) 125 mg chloroquine sulphate (b) 100 mg chloroquine phosphate should be prescribed for a total dose of 300 mg chloroquine base? How many ml of the syrup chloroquine sulphate should be prescribed?

   250mg chloroquine phosphate = 155 mg chloroquine base
   200mg chloroquine sulphate = 150 mg chloroquine base
   Syrup chloroquine sulphate 68 mg/5ml (= chloroquine base 50mg/5ml)

7. If 1 ml of 1:200 solution is diluted to 5 ml, what is the strength of resultant solution?

8. A patient is brought to the casualty with the complaint of chest pain of sudden onset. On examination he appears agitated, has cold & clammy skin and is sweating. His BP is 75mm Hg (Systolic) Body weight: 70Kg Bilateral basal crepitations are present. ECG was suggestive of extensive anterior wall myocardial infarction. Chest radiograph showed pulmonary congestion.

   a) How would you start a dopamine drip for this patient? Dopamine vials are available at a concentration of 200mg /5ml
   b) What will be the required drop rate?
   c) How many hours will this infusion last?
DATA COLLECTION AND PRESENTATION

OBJECTIVES:

At the end of the practical class the student shall be able to:
1. present data in a tabular form.
2. carry out basic statistical analysis of data.
3. interpret the results and draw conclusions.

I. Data Presentation:

An introductory class will be taken on data presentation (30 min) and students will be divided into 4 groups. Each group will be given simulated results (data) of an experiment and asked to devise a table to display the data (30 min). Plenary will be held where each group will present their table.

Task A: Read the following situations and present the data in a tabular form:

(The same set of problems is to be used for Data analysis - see below)

1. In an experiment, 2 groups of 6 rats were injected with amphetamine and saline respectively and food intake was measured for 2 hrs. The initial weight of rat food was 10 g for each rat. At the end of 2 hrs, the remaining food was weighed and the following data were obtained:

   Group I - Saline               - 8.21, 5.3, 6.40, 7.584, 6.120, 7.2 g
   Group II - Amphetamine   - 9.5, 9.473, 9.24, 8.9, 9.90, 10 g

2. The effects of atropine (1.0 % solution) on the pupil size was studied in 8 rabbits. The pupil size was measured before and after administration of saline in one eye and atropine in the other. The data obtained were as follows.

   Right eye
   Saline (1drop) before:  5, 6, 3, 4, 7, 5, 6, 5 mm
   after:  6, 5, 4, 4, 6, 6, 6 mm

   Left eye
   Atropine (1 drop) before: 5, 6, 3, 4, 7, 5, 6, 5 mm
   after: 7, 8, 9, 6, 8, 9, 6, 8 mm

3. The cardiostimulant activity of a plant extract (2 µg) was compared with that of epinephrine (2 µg). Twelve isolated frog heart preparations were used and heart rate was observed after administration:

   Preparation no.  1- 6:
   Basal heart rate - 58, 62, 54, 45, 75, 80 bpm
   Epinephrine      - 90, 85, 62, 60, 85, 91 bpm

   Preparation no.  7-12:
   Basal heart rate - 75, 70, 61, 52, 73, 75 bpm
   Plant extract      - 91, 89, 83, 59, 81, 87 bpm
4. The analgesic effect of morphine (3 mg/kg; sc) and aspirin (10 mg/kg; sc) were compared using 0.6% acetic acid writhing. The data are as follows.

- **Saline** (n=6): 22, 25, 29, 30, 21, 32 writhings (in 15 min)
- **Aspirin** (n=7): 15, 18, 18, 20, 22, 17, 16 writhings (in 15 min)
- **Morphine** (n=6): 5, 8, 11, 2, 10, 4 writhings (in 15 min)

**Checklist for table**

**Contents:**

1. Table No. and Title
2. Column headings
3. Serial No. for rows
4. Units
5. Species & No. (‘n’ of subjects/animals)
6. Drugs name & doses, route
7. Asterisks to indicate significance
8. Foot notes
   a. The values (Mean ± SD)
   b. P values /df (degrees of freedom)
   c. Expansion of abbreviations if any
9. Important derived data.

**Characteristics:**

1. Lines
2. Alignment (horizontal & vertical)
3. Uniformity
4. Precision
5. Simplicity
6. Clarity
DATA ANALYSIS

An introductory class will be taken on statistical analysis of data (2 hr) and students will be taught how to choose a statistical test and do calculations. A sample problem will be derived in the class. All students have to carry out the tasks A & B (choose a test and analyze the data) individually for all problems. They will work out the solutions in the record notebook and submit the same for correction.

Task A: Choose an appropriate statistical test to analyze the data presented in problems 1-4. Use the worked out example as a guide to arrive at a logical conclusion for choosing the test. Analyze the data and draw conclusions.

Task B: Choose the most appropriate statistical test you would use for problems 5-9.

5. A new drug was tested to see whether its concentration in the body alters with time. 10 mg of the drug was given iv and plasma concentration was measured at 4, 8, 12, 24, 48 & 72 hrs.

6. The wound healing effect of a traditional drug was tested in rats. Two groups of rats (6 each) were administered either saline or test drug and the effect was measured in scores (0-5; 0 -No healing; 5- Complete healing)

7. The antihypertensive effect of a drug was measured in 10 rats. Baseline mean BP was measured on day 0. The drug was given on day 1,2,3….10. BP was recorded on days 1,2,3….10.

8. A traditional medicine is marketed with claims of glycemic control in diabetics. To find whether the product actually reduced blood sugar levels, the participants of a study are randomized to receive either placebo, metformin or the traditional medicine.

9. Does blood pressure vary with bodyweight? To find out this, mean BP and weight of 100 rats were measured.

10. The effect of atropine on physostigmine induced salivary secretion was studied in 6 dogs. Salivation was scored (0 - no salivation; 1- mild; 2- moderate; 3-high; 4-frothing) after physostigmine administration. Then atropine was given. After 15 min another dose of physostigmine was given and salivation scored.

11. A new antibiotic has shown efficacy against MRSA in in vitro studies. A clinical trial was conducted to compare the clinical efficacy of the new antibiotic with vancomycin.

12. A new chemotherapeutic regimen was designed for use in lung cancer.
   a. A study was carried out to find the average time span between treatment and death of the patients undergoing treatment with the new regimen and the standard regimen.
   b. The study also wants to show that the new chemotherapeutic regimen is better than the standard chemotherapy regimen.
Worked Example

Aim To see whether amphetamine alters food intake.

Analysis type Comparison of means

Parameter to be analyzed Food intake

No. & Name of the groups / data sets to be analyzed - 2; saline & amphetamine

Distribution of data (Normal or Non-normal) Normal

Design (Paired or Unpaired) Unpaired

STATISTICAL TEST TO BE USED? (to be chosen from the table provided in Annexure - 6)
ANIMAL HANDLING AND ETHICAL USE OF ANIMALS IN RESEARCH

OBJECTIVES:

At the end of the session the student shall be able to:

1. Realize the importance of using animals for pre-clinical testing.
2. Justify the need for adhering to proper standards of maintenance and care in the use of animals for research and teaching.

The class is divided into two batches. One batch will be taken to the central animal house for a visit. This will be followed by a debate on the topic “The use of animals in research and teaching is justified.”

Visit to animal house – 45 minutes
Preparation time for debate – 30 minutes
Debate – 1 hour
Concluding remarks by faculty – 10-15 minutes

Batch A will defend the use of animals in research and teaching. Batch B will speak against the use of animals in research and teaching. Use the given printed material for preparation in addition to your own views. Select three speakers from each team who will speak for five minutes each. Preparation time 30 minutes. Each batch will visit the animal house and discuss the following points at the animal house:

1. Maintenance of stock
2. Separate housing of species
3. Separation of pregnant, just delivered, pups, sick animals.
4. Maintaining room temperature
5. Feeding practice (pellets, greens etc.)
6. Need to use inbred strains in experiments
7. Disposal of dead animals
STUDY OF THE ACTION OF DRUGS ON THE RABBIT’S EYE – DEMO & CAL

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. Instill the drugs carefully into the rabbit’s eye by the pouch method without injuring the cornea.
2. Study the effects of drugs on the rabbit’s eye.
3. Record, analyze and interpret the observations obtained during the experiment.
4. Use software to demonstrate the effects of drugs on rabbit eye

Venue: Seminar room

Animals: Rabbits

Apparatus: Droppers, measuring scale, torch, cotton wool, calculator (optional)

Drugs & solutions:
1. Saline
2. Eserine salicylate 0.5%
3. Atropine sulphate 1.0%
4. Lignocaine 1.0%

PROCEDURE

Place the rabbit (No.1) on the table. Measure the diameter of both the pupils with the help of a scale. Observe the condition of the conjunctiva (congested or not) and elicit the corneal and light reflexes. Record your findings. In the left eye put one drop of saline and in the right eye one drop of eserine. Use the pouch method for instilling the drops. After adding the drops, the medial canthus should be pressed for 30 seconds. Record the following parameters at one minute, 5 minutes and ten minutes after instilling the drug and saline. Parameters to be measured:

1. Diameter of the pupil
2. Light reflex
3. Corneal reflex

Record your observations in a tabular form. Repeat the same procedure for atropine, and lignocaine on separate rabbits (Nos 2, & 3).

Presentation of data and analyses:

Pool the data from other groups (for atropine at 10 minutes only) and formulate appropriate table(s) to display the data. Analyze the pooled data using appropriate statistical test(s) and draw conclusions. Make sure that table(s) is/are complete in all respects. A sample of the tables for recording pooled data and for doing the Student’s t test is given in Appendix - 3.
CAL

The students will be taken to the computer lab where the computers are pre-loaded with ExPharm software. The batch is divided into several groups of 2 students each. An instructor will then outline how to operate the software and you are allowed to work on your own.

Demonstrate the effects of ephedrine (0.5%) and adrenaline (0.1%) on rabbit’s eye.

Demonstrate the changes in intraocular tension with various drugs.

QUESTIONS

1. Name three miotics, mydriatics and ocular local anaesthetics used clinically and list their important uses and contraindications?

2. The stomach wash fluid taken from a case of poisoning produced pin-point pupils when instilled into the eye of a rabbit. The intraocular tension was found to be decreased. What is your probable diagnosis? Justify your answer.

3. What will be the mydriatic of choice in elderly for refraction testing?

4. Name some systemic drugs with ocular side effects?

5. List the ophthalmological routes of administration? Draw a diagram to illustrate the sites.
OBJECTIVES:
Appreciate how the route of administration influences the onset of action of a drug.

PROCEEDINGS:

Comparison of intra peritoneal and subcutaneous routes of administration of ketamine.

Task: Inject ketamine hydrochloride (50mg/ml) in the dose of 0.02ml/mouse into two mice by the subcutaneous route. Inject the same volume by the intra peritoneal route to another two mice. Record the time of injection and the time of onset of drug action (loss of co-ordination / loss of righting reflex). Note the time at which the animals recover. Copy down the data obtained by the other groups to make a master table. Calculate the average time taken for onset of drug action and duration of effect. Tabulate your observations.

QUESTIONS:

1. List the commonly used sites for subcutaneous injection in humans.

2. Select a suitable route of administration of the drug for the following case scenarios. Justify

   i. 56 yr old Rajasekar complains of sudden onset of chest pain in the left side radiating to his left shoulder and inner aspect of the arm. He is sweating and in severe distress. Drug to be used is isosorbide dinitrate.

   ii. 27 yr old Srinivasan admitted as a case of right inguinal hernia is posted for surgery. The sensitivity testing of lignocaine is to be done before doing the surgery.

   iii. 14 yr Vinoth fell down during play on the road and had abrasions on his knee. He needs to be administered tetanus toxoid.

   iv. 4 year old Nagarjuna is brought to pediatric casualty with febrile convulsions. Drug to be given is Diazepam.

   v. 46 yr old Gandhi, a type I diabetic needs to be given human insulin injection daily.

   vi. 20 yr old Dennis, with frequent complaints of motion sickness plans to travel to a hilly area. Scopolamine is to be administered for prophylaxis.
EFFECT OF DRUGS ON THE CILIARY MOTILITY OF FROG OESOPHAGUS

COMPUTER ASSISTED LEARNING (CAL) METHOD

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. Explain the effect of drugs on ciliary motility of frog oesophagus.

2. Interpret the observations and explain the basis for the same.

3. List the uses of cholinergic and anticholinergic drugs and explain the basis for their use in each condition.

Venue: Seminar room

In the seminar room, the computers are pre-loaded with Ex-Pharm software. The batch will be divided into several groups of two students each. The teacher will then outline how to operate the software and you are allowed to work on your own. Write down the procedure, drugs used and record the findings giving reasons for the changes in ciliary movement.
EVALUATION OF ANALGESICS BY CHEMICAL METHOD

OBJECTIVES

At the end of the practical class the student shall be able to:

1. Calculate and measure the exact quantity of drug to be injected to the animal.

2. Administer the drugs by the subcutaneous and intraperitoneal routes to mice.

3. Identify and record chemically induced abdominal constrictions in mice.

4. Tabulate observations and draw suitable inferences from the experiment.

Chemical Method: Acetic acid induced abdominal constrictions

Animals: 3 Mice (if female, non-pregnant)

Apparatus: Syringe (with 100 divisions) 26g needle

Drug & Solutions:

Morphine sulphate 1mg/ml
Diclofenac 1 mg/ml
Acetic acid 0.6%
Saline

PROCEDURE:

Weigh 3 Swiss albino mice (in g) and number them. Pretreat first mouse with morphine 5 mg/kg sc, second mouse with diclofenac 1 mg/kg sc and the third one with saline (0.1 ml) sc. Note the time of injection. 30 min after injection of drugs / saline, inject 0.3 ml of 0.6 % acetic acid ip to each mouse with 26G needle. Place the mouse on the top of a stool for better observation. Observe the number of abdominal constrictions (writhing or stretching syndrome) for the next 15 minutes. One constriction is taken as the complete movement from side to side (both sides). Observe only one mouse at a time and note the position of the tail in the mouse treated with morphine. Tabulate your observations. Pool the data from other groups, tabulate the data, calculate mean and SD and use appropriate statistical tests (unpaired t test) and draw inferences based on the statistical analysis.

Note: Using this test both central and peripheral analgesics can be detected.
Questions

1. What is Straub’s phenomenon? Write its other name

2. Name the source of morphine?

3. List two uses and contraindications for the use of morphine.

4. List two uses and adverse effects of diclofenac.

5. List the other methods for evaluation of analgesics in animals.

6. Forty five year old Mrs. Kamala was brought to the casualty with severe abdominal pain and was given injection morphine. Comment.

7. Sixty five year old Mr. Chellappan is undergoing radiotherapy for bone metastasis of prostatic carcinoma which was operated 5 months before. Now he complains of pain in the right side of his hip that is worsened by walking and sitting. Assuming that the pain was due to metastasis the patient was prescribed tab. aspirin 160 mg bd. Comment, correct and rewrite if necessary.
EFFECT OF DRUGS ON PERFUSED FROG’S HEART –
COMPUTER ASSISTED LEARNING (CAL) METHOD

OBJECTIVES

At the end of the practical class the student shall be able to:

1. Explain the effect of drug on perfused frog heart
2. Interpret the observations and explain the basis for the same.
3. List the cardiac stimulants & depressants and understand the rationale for their use in therapy.

Venue: Seminar room

The students will be taken to the computer lab in the seminar room where the computers are pre-loaded with ExPharm software. The batch is divided into several groups of 2 students each. The teacher will then outline how to operate the software and you are allowed to work on your own. Write down the procedure, drugs used and record the findings giving reasons for the changes in heart rate, rhythm and amplitude. You have to find out the unknown drug given in the program.
STUDY OF ACTION OF HALOPERIDOL ON MICE

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. Observe and record catalepsy induced by haloperidol in mice.

2. Understand the limitations of preclinical testing of drugs used in the treatment of psychiatric illnesses.

Animals: Mice

Apparatus: Kymograph with the drum removed

Drugs and solutions:

- Haloperidol 1.0 mg/ml
- Normal saline

PROCEDURE

LOCOMOTOR ACTIVITY: Remove the drum from the kymograph. Set the speed to 10rpm. Now place the kymograph horizontally and place it at the edge of the table so that the rod is positioned outside the table. Place a large rat cage lined with husk under the rod (approximately 1 meter below the rod) and switch on the kymograph. Take 2 mice and place them on the moving rod. Observe for 1.5 minutes. Note the number of times they fall off the rod during the session. If the mouse falls off the rotating rod, place them once more on the moving rod.

Inject Haloperidol 4mg/Kg ip into one mouse and equal volume of saline into the other mouse. Now repeat the experiment after 10, 40 and 80 minutes. Note the number of times the mice fell during a session.

CATATONIA: Note how animals exhibit normal exploratory behaviour. Grade catatonia (capacity of the animal to maintain a fixed position) at the end of 10, 20, 40 and 80 minutes after injecting the drug.

Grade 0 - It moves normally.
Grade 1 - It moves when touched or pushed.
Grade 2 - When placed on table with front paws set on a block and fails to correct its posture in 10 secs
Grade 3 - Place the mice on the wires of the lid of a rat cage and hold the lid vertically upright so that the mice are positioned head down. If the mice are rigidly positioned (head down) for 30 secs it is Grade 3 catatonia.

Make a separate table for each of the parameters and record your observations.

Tabulate your findings after pooling data from all groups for catatonia at 80 minutes. Find the proportion of animals staying on the rotating rod at the end of the experiment. Name a suitable statistical test for the experiment on catatonia. Draw conclusions and write inferences. A group discussion on drugs causing extrapyramidal effects, its mechanism and management will follow.
EXERCISE NO. 16

EFFECT OF DRUGS ON DOG’S BLOOD PRESSURE –
COMPUTER ASSISTED LEARNING (CAL) METHOD

OBJECTIVES

At the end of the practical class the student shall be able to:

1. Explain the effect of drugs acting on the autonomic nervous system on blood pressure and heart rate.

2. Identify an unknown drug using these two parameters and its interaction with other known drugs

Venue: Seminar room

The students will be taken to the computer lab in the seminar room where the computers are pre-loaded with E P – Dog software. The batch is divided into several groups of 2 students each. An instructor will then outline how to operate the software and you are allowed to work on your own. Write down the procedure and drugs used and tabulate findings giving reasons for the changes in heart rate, respiration, or increase or decrease in BP. Draw the graph obtained and find out the nature of the unknown drug given in the program.
OBJECTIVES:

At the end of the practical class the student shall be able to:

1. Understand the basic principles and importance of bioassay.

2. Use the CAL software for determining the concentration of histamine in the unknown solution.

Venue: Seminar room

The teacher will take a lecture class on the basics principles, importance and various methods of bioassay for 30 minutes. Then the batch is divided into groups of two students. The students are allowed to work on the computers loaded with ExPharm software. The teacher then demonstrates how to use the software. The students have to perform a matching assay to find out the concentration of histamine in the unknown solution.
OBJECTIVES

At the end of the practical class the student shall be able to:

1. List unbiased sources of drug information
2. Understand the concept of evidence based medicine
3. Select the appropriate source of drug information depending on the information required.
4. Analyze a clinical condition based on the available scientific evidence
5. Appreciate the merits and limitations of the various sources.

Part I – Sources of drug information

At each station, you will find some books/computer with internet access which are important sources of drug information. Look for answers to the questions in these sources and write them in your note-books. Each source is the best guide for the particular type of information mentioned in the group tasks.

Station No.1 – British Pharmacopoeia, Indian Pharmacopoeia

**Task 1:**  
(A) What is the Dextran 70?  
(B) How is it administered intravenously & what is the dose?  
(C) What is the source of this information? (Write the name of the book)

**Task 2:** An Ayurvedic formulation suspected to have prednisolone was sent to you. Find the test or method that can be used to confirm the presence of prednisolone in the preparation. What is the source of this information? (Write the name of the book)

Station No. 2 - British National Formulary

**Task 1:** Can nadolol be given during lactation?

**Task 2:** Can the sodium salt of frusemide inj. be added to a 5% glucose drip?

Station No. 3 - Martindale’s extrapharmacopoeia

**Task 1:** What is the incidence of anaphylactoid reaction with acetylcysteine & does it have any relation with the dose?

**Task 2:** Find out the dose dependent CNS adverse effects that have been reported with the use of metoclopramide

Station No. 4 - Monthly Index of Medical Specialities (MIMS) and Current Index of Medical Specialities (CIMS)

**Task 1:** Mr. Ranjith, 67 year old man, a known case of diabetes with hypertension for the last 10 years was on the following drugs.

Tab GLYFIX 1 mg od  
Tab METKAP 500 mg tds  
Tab BPZIDE 25 mg bd  
Tab ECOSPRIN 150 mg od
Find out the total cost of therapy (for 1 month), write the company name & as well as source of information with page no.

**Task 2**: What is the total cost of therapy for a course of cap amoxycillin 500 mg for 7 days? Calculate the total cost for the most and least expensive brands of amoxycillin 500 mg for 7 days. (Write the brand name of the drug and the company name)

**Station No. 6**: Internet

**Task 1**: Mention the drug interactions (if any) that have been reported with azithromycin.

**Task 2**: What precautions need to be taken while administering pegvisomant? What are the adverse effects of pegvisomant?

**Task 3**: List the drugs/drug combinations approved in the year 2011 for the treatment of
  (i) Rheumatoid arthritis in U.S.
  (ii) Iron deficiency anemia in India
Name the organizations which are involved in approval in these two countries

**Task 4**: List the drugs banned in India in the current year

References (website) for internet related tasks
  1. Uppsala monitoring centre
  2. United States Food and drug administration
  3. Centre for drugs and standard control organization
Part II – Evidence based drug use

In order to practice evidence-based medicine effectively, there is a need to acquire and develop skills in literature search and critical appraisal. The batch will be divided into groups. The students will find answers to the following tasks utilizing the internet and other sources of drug information.

Task 1: Mr. Philip Jones, 38 years is on metformin 500mg bd and rosiglitazone 4 mg bd for the past 2 years for type 2 diabetes mellitus. During a follow up visit, his fasting blood sugar was 150 mg/dl and post prandial blood sugar was 210mg/dl. The physician plans to add the new drug liraglutide. Find out the recommendations for liraglutide as an add on therapy in this case and what is the amount of HbA1C reduction that can be expected to occur.

Task 2: Valethamate bromide is a commonly used drug for cervical dilatation in women who are in labour. Discuss the rationale for use of this drug based on the scientific evidence available.

Task 3: Mr. Lal, 52 years, a known case of ischemic heart disease is posted for percutaneous coronary intervention (PCI). He is given a bolus dose of 300mg clopidogrel as a routine procedure before PCI. ECG changes suggestive of myocardial ischemia are recorded during the procedure. What could be the reason for lack of efficacy of clopidogrel in this case. What are the other drugs that are currently approved for this procedure?

Task 4: Mr. Gopalan, a 60 year old diabetic patient presented with complaints of dizziness, blurred vision and confusion for the past 2 days. History reveals that he has returned from United States last week where he was prescribed cap lyrica (trade name) 100mg bid for neuropathic pain which he had been taking regularly. His random blood glucose level was within the normal range. Find out the possible reason for his complaints by looking up the details of the drug lyrica.

Task 5: Mr. Senthil, 40 years has been using chlorhexidine mouth wash regularly for the past one year for reduction of plaque. He is anxious since he came across an article in the newspaper that mouth washes can produce cancer. Give him suggestions regarding further use of chlorhexidine mouth wash based on the current evidence.
P DRUG CONCEPT, INDIVIDUALIZATION OF DRUG THERAPY AND PHARMACOECONOMICS

OBJECTIVES:

At the end of the practical class the student shall be able to:

1. Understand the concept of 'p' drug and 'p' list
2. Identify the general principles involved in making a 'p' list of drugs
3. Make a 'p' drug list for common diseases encountered in clinical practice
4. Acquire the skills involved in choosing an appropriate drug regimen in patients with respect to his/her risk factors and disease characteristics.
5. Learn the basic concepts of pharmacoeconomics.
6. Use web based dose calculators

A teacher will explain the concept of p drug list and the steps involved in making a p list. The students will also be taught about pharmacoeconomics and the various principles in rational drug utilization. The batch will be divided into groups and will be given 30 minutes to carry out the group tasks.

References

WHO manual - Guide to good prescribing
Goodman & Gilman - The pharmacological basis of Therapeutics
Bertram G Katzung - Basic & Clinical Pharmacology

GROUP TASKS

Group 1
You are working as a private practitioner in a village 25 km from Chennai. Prepare your ' p' list of drugs for hypertension and mention the rationale for your choice.

Group 2
You are working as a physician in a multispecialty hospital in Hyderabad. Prepare your 'p' list of drugs for diabetes and mention the rationale for your choice

Group 3
You are working in a district hospital in Kerala. What will be your 'p' list for community acquired pneumonia?

Group 4
Mrs Mangala, 20 years of age, is a daily wage labourer earning Rs 100/day who presents to the hospital with recurrent generalized tonic clonic seizures. She has been on drug therapy with tab phenytoin 100 mg tds for the last two years. In the last three months she has been on irregular drug therapy owing to the occurrence of excessive fatigue and coarse facial features. Discuss the alternatives based on the patient’s characteristics.
Group 5
Mr Kanhai, a bank manager, 55 years of age is diagnosed with ischemic heart disease. He is also detected to have hypertension (150/90 mmHg), diabetes (RBS - 170 mg %) and dyslipidemia (TC-210 mg/dl, LDL - 150 mg/dl, HDL - 33 mg/dl). Coronary angiography reveals single vessel disease amenable to medical therapy. Discuss the different options available for this patient. Calculate the cost of therapy in the final regimen that you have chosen.

Group 6
Mr Jeganath 37 years of age is admitted in the medical ward of a tertiary care hospital for Enteric fever. What are the possible treatment options for this patient? Calculate the cost of each therapeutic option.

Group 7
Mrs Kiran, 61 years of age is a patient with infective endocarditis who is to started on vancomycin therapy. Her height is 5 ft, 3 inches and she weighs 55 kg. Her serum creatinine is 2.3 mg/dl. What will be the dose requirement for this patient and the frequency?

Group 8
Ms Kalpa 23 years of age is diagnosed with mitral stenosis and atrial fibrillation. Echocardiography shows a 1 X 1.2 cm clot in the left atrium. She is to be started on tab warfarin. Her PT INR requirement is 2.5. What will be the dose that you would start the patient on? (body weight - 55 kg, height 158 cm)
OBJECTIVES:

At the end of the practical class the student shall be able to:

1. Semi-quantitatively estimate the levels of sodium salicylate in the serum.
2. Understand the importance of timing of sample collection in relation to drug intake when estimating drug levels.
3. Understand the importance of bioavailability and pharmacokinetics in clinical practice.

Drugs and solutions:

- a) Aspirin Brand A and B (6 gm)
- b) Serum samples taken at 0, 15, 45, 75, 90, 120, 150, 180, 240, 360, and 480 minutes after ingestion of A and B
- c) Standards of concentration 25, 50, 100, 200, 350, 500, 600 and 700 µg/ml
- d) Trinder’s reagent

Apparatus: Test tubes, 1 ml and 5 ml pipettes.

Procedure

Eleven serum samples of drug A collected at 0, 15, 45, 75, 90, 120, 150, 180, 240, 360, and 480 minutes after ingestion of aspirin are provided. The concentration of salicylate in each sample is estimated by adding 5 ml of Trinder’s reagent into 1 ml of serum. After 10 minutes the concentration of salicylate is (semi-quantitatively) estimated by comparing the colour of the test solution with the colour of standards solution (to be provided).

The serum concentrations for drug B is provided below

<table>
<thead>
<tr>
<th>Time (mins)</th>
<th>0</th>
<th>15</th>
<th>45</th>
<th>75</th>
<th>90</th>
<th>120</th>
<th>150</th>
<th>240</th>
<th>360</th>
<th>480</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration (µg/ml)</td>
<td>0</td>
<td>50</td>
<td>100</td>
<td>250</td>
<td>400</td>
<td>350</td>
<td>250</td>
<td>100</td>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

Plotting and calculation:

Draw a ‘Concentration Vs Time’ plot using a semilog paper and calculate the Area Under the Curve (AUC), Concentration at 0 min (Co), apparent Volume of distribution (aVd), Clearance (Cl), and elimination t-half (t1/2). Compare the AUC of drug A and B to find out the relative bioavailability of the drug A.

AUC is calculated using the trapezoidal rule.

Formula:  
\[ AUC = \frac{1}{2} (c_1 + c_2) \times (t_2 - t_1) + \frac{1}{2} (c_2 + c_3) \times (t_3 - t_2) + \cdots + \frac{1}{2} (c_{n+1} + c_{n+2}) \times (t_{n+1} - t_n) \]

where \( c \) = concentration in µg/ml and \( t \) = corresponding time in min. AUC is expressed as µg.min/ml

Co is found out by extending the terminal elimination curve to meet the Y axis. The concentration at the intersection is taken as Co. It is expressed as µg/ml

aVd is calculated by dividing the total dose (D) by Co and is expressed as ml.
Cl is calculated using the formula dose (D)/AUC. It is expressed as ml/min

t<sub>1/2</sub> can be calculated by finding out the time corresponding to (Co/2).

Relative Bioavailability = (AUC<sub>A</sub> / AUC<sub>B</sub>) X100 %

Questions

1. A newer drug jipnatide for type 2 diabetes was tried in healthy normal volunteers for safety and pharmacokinetic data. The clearance and Vd of the drug was found to be 1.28 l/h and 80 l respectively. Calculate the half – life of this drug.

2. 18 yr old Mr. Rakesh was brought to the casualty by his friends in an unconscious state. His friends stated that Rakesh has taken a high dose of paracetamol 6 h earlier. The casualty medical officer immediately sent the blood for analysis and the report showed paracetamol level in the blood to be 25 µg /ml. Assuming that Vd and t½ of paracetamol to be 60 L and 3 hrs respectively in this patient, calculate the dose of paracetamol the patient would have consumed 6h earlier
PREPARATION OF SOLUTION FOR TEST DOSE OF PENICILLIN

OBJECTIVES

At the end of the practical class the student shall be able to:

1. Dispense a 5 ml solution of sodium penicillin G for intradermal sensitivity testing.
2. Take adequate aseptic precautions during the preparation of the solution.
3. List the sign and symptoms of the anaphylactic reaction to penicillin and the measures to be taken to treat such a reaction.

A brief introduction on the signs & symptoms of anaphylactic shock to penicillin and its treatment will be given (15 minutes). The batch will be divided into small groups of 5 – 6 students. Each group has to prepare the solution. Dispense a 5 ml solution of sodium penicillin G for intradermal sensitivity testing. (1 hour). Small group discussions on aseptic precautions (10-15 minutes) will be conducted after the task is completed.

[Please bring 1 ml, 5ml and 20ml sterile disposable syringes (one no. each)]

Task: Prepare and dispense a 5 ml solution of sodium penicillin G for intradermal testing.

from the given stock solution of 5/10 lacs/ vial.

COMPOSITION:

Sodium penicillin G 100 Units
Sterile water for injection to make 1 ml

PROCEDURE:

Penicillin G sodium 10,00,000 units
Sterile water for injection 100 ml
Mix under aseptic conditions. Send such 5 ml.
Inject 0.02 ml intradermally on the forearm and observe the reaction for 30 minutes.

To a vial containing 10,00,000 units/vial of Sodium Penicillin G add 5 ml of sterile water for injection and reconstitute to obtain 2,00,000 units/ml. Take 0.1ml of this solution in a syringe and transfer it to an autoclaved 30 ml vial. Dilute to obtain 20ml by adding 19.9 ml of sterile water for injection with the help of a sterile 20ml syringe. This solution now contains 1000 units/ml. Transfer 0.5 ml of this solution to another small sterile vial and dilute to 5 ml by adding 4.5 ml of sterile water for injection.

LABEL

Penicillin G 100 units/ml solution for sensitivity testing
Discard the solution after 24 hours.

Questions:

1. A newly diagnosed case of rheumatic fever was given penicillin G injection. The patient, an 18 yr old boy suddenly developed respiratory distress, stridor, rashes, and swelling of lips and tongue. (On enquiry sensitivity testing has been neglected on this patient). How will you manage this patient?
2. Name three drugs for which sensitivity testing is required. Justify your answer
3. List the precautions to be taken before doing any sensitivity testing
4. What is desensitization and what is the principle of desensitization?
THERAPEUTIC DRUG MONITORING

OBJECTIVES:

At the end of the session the student shall be able to:

1. Define therapeutic drug monitoring and understand the indications and applications of therapeutic drug monitoring.
2. List some common drugs that require therapeutic drug monitoring.
3. Understand the basic procedures involved in therapeutic drug monitoring.
4. Understand basis of pharmacogenetic study and basic steps involved in identifying genetic mutations and their clinical implications regarding drug metabolism.
5. Fill up a therapeutic drug monitoring form.

Introduction to TDM by faculty.
Visit to TDM and Pharmacogenomics Laboratories
Group tasks and plenary session. (Bring your text-books for the class).
See Annexure - 7 for sample copy of TDM form.

Group 1:

1. Define Therapeutic Drug Monitoring. Explain its application.
2. Discuss the various patient and drug factors that explain the variability in drug response.
3. Blood samples were taken from the following patients for TDM
   • A patient who has been taking lithium for bipolar mood disorder
   • A patient who has been taking propranolol for hypertension
   • A patient who has been taking phenytoin for epilepsy and not showing response.
   Discuss each regarding rationality for TDM.

Group 2:

1. What clinical data should be made available to the lab doing TDM? Justify
2. At what time should the sample be taken for the following drugs: digoxin, phenytoin, theophylline, gentamicin. Give reasons
3. A sample of blood along with a form has been sent for TDM. Comment on this

Group 3:

1. List limitations of TDM.
2. Describe how genetic mutations affect drug levels. Give 2 examples.
3. A 40 year old woman was reported to have taken an overdose of carbamazepine. She was brought to the hospital in a comatose condition. A blood sample was sent for estimation of carbamazepine.

Drug levels: Carbamazepine 60 µg/ml (normal levels of carbamazepine 4-12 µg/ml)

What would you advise the physician in charge regarding individualizing the dosage of carbamazepine?
CRITICAL APPRAISAL OF DRUG ADVERTISEMENTS

OBJECTIVES:

At the end of the practical group work, the student shall be able to analyze critically, drug promotional literature for proprietary preparations, in terms of the

(a) Claims of pharmaceutical companies on the pharmacological actions of their ingredients
(b) Economics of use
(c) Rational or irrational drug combinations, if any
(d) Identify unethical marketing practices
(e) Realize the extent to which drug advertisements can influence prescribing behaviour.

A brief introduction (15-20 mins.) on drug promotion will be given highlighting its advantages and disadvantages, ethical and unethical aspects. The ethical criteria for medicinal drug promotion and its key messages will be discussed. The batch will be divided into groups of 5-6 students each and each group will be given one or two advertisements and asked to carry out a group task (30 minutes) followed by a plenary (one and a half hours).

Task:

Carefully go through the given drug advertisements. Measure the size of the brand name and generic names. Critically analyze the given advertisements and give your opinion on the following:

a) Validity of scientific claims
b) Content of scientific information
c) Relevance of references cited
d) Appropriateness of illustrations

Analyze critically, drug promotional literature for proprietary preparations, in terms of the (a) pharmacological actions of their ingredients (b) claims of pharmaceutical companies (c) economics of use (d) rational or irrational nature of fixed dose drug combinations.

POINTS TO DISCUSS

1) Is drug advertising necessary?
2) To what extent do drug advertisements influence prescribing habits?
3) What information is necessary in order to prescribe rationally?
4) What should be done if an advertisement is misleading?
EFFECTIVE DOCTOR - PATIENT COMMUNICATION

OBJECTIVES:

At the end of the session a student shall be able to:

1. Realize the importance of effective communication in achieving optimal drug use.

2. Identify that effective communication is directly related to patient compliance.

3. Comprehend the dynamics of effective communication during a consultation.

4. Appreciate the influence of cultural and socioeconomic factors on compliance to therapeutic recommendations.

A short introduction on communication and its importance is given for 20 minutes. The class will be divided into groups of 4-5 students. Prepare role-plays to highlight the salient features of possible adverse drug reactions, proper usage (when to start/stop), precautions, contraindications, return for refill/assessment of the given drug. Focus on methods of establishing rapport, active listening, usage of lay-terms in explaining, body language etc., When one group has finished its role-play the other groups have to comment on the play. All 4 or 5 groups will perform their respective role-plays. The teacher will comment only after all the role-plays have finished. If time permits one of the groups will be asked to re-enact the play with suggested modifications.

During role-play observe the following:

Non verbal communication

Verbal communication - Patient's complaints
Prescriber's
- questioning about complaints: length, severity
- diagnosis
- explanation about diagnosis/disease
- explanations to patient's questions
- explanation about treatment, particularly drugs.

Observe explanations on the following in detail:
- name of drug
- therapeutic effects
- side effects
- how to take it
- when to stop
- other information
- patient's questions about treatment
- how to prevent the disease/exacerbation
- other information.

Dept. of Pharmacology, JIPMER
OBJECTIVES:

At the end of the session a student shall be able to:

1. Define the concept of essential medicines and appreciate its importance.
2. Understand the relevance of an essential medicines list at various levels of health care.
3. List the guidelines for selection of essential medicines.
4. List data required for generation of essential medicines list
5. Prepare an essential medicines list for various levels of health care
6. Understand the concept of "p" drug and "p" list

A teacher will explain the importance of rational prescribing and the essential medicines concept (30 minutes). The batch will be divided into 4-5 groups. Each group will be given a group task to be completed in 45 minutes. A plenary is held after the completion of group tasks (60-75 minutes). Each group will be asked to present their completed task and other groups asked to comment on it.

GROUP TASKS

Group 1
You are a general practitioner in a small village. You are frequently called at night to attend to patients in their homes. Prepare a list of drugs that you will carry with you to treat these emergencies.

Group 2
Prepare an essential medicines list of cardiovascular drugs for a primary health centre.

Group 3
Prepare an essential medicines list of drugs used in endocrine disorders for a tertiary care centre.

Group 4
Prepare an essential medicines list of antibiotics for a primary care centre.

Group 5
Prescribe a P drug for a patient with angina pectoris

Questions:

1. What are essential medicines?
2. What is the rationale behind having a separate list of essential medicines in each health care facility?
3. What are the general guidelines for establishing a list of essential medicines?
MANAGEMENT OF SOME COMMON POISONINGS – i & ii

OBJECTIVES:

At the end of the session the student will be able to:

1. List the general supportive measures to be extended to a patient with poisoning

2. Understand the principles of treatment of a patient with poisoning.

3. List the steps in the management of a patient with (a) organophosphorus poisoning (b) Illicit liquor poisoning (c) Snake-bite, (d) scorpion sting (e) Yellow Oleander poisoning.

The most commonly encountered emergency poisonings in Pondicherry are the following:
Plant: Yellow Oleander
Animal: Snake bite, Scorpion sting
Drug: Organophosphorous compounds, illicit liquor (methyl alcohol).

An introduction on the general supportive measures to be given to a patient with poisoning is given by a faculty member (15 min).

Students are divided into 5 small groups and each group is allocated a group task (45min). A plenary is conducted after completion of group tasks. During plenary (1-1½ hour) a small group discussion will ensue following the presentation of each group.

GROUP TASKS

(a) List the common signs and symptoms of poisoning/bite/sting.
(b) Formulate a plan of management for
   (i) first-aid
   (ii) Definitive treatment of a patient with the same.
(c) Do you need to take any precautions during therapy?

Group 1: Yellow Oleander
Group 2: Snake bite
Group 3: Scorpion sting
Group 4: Methyl alcohol
Group 5: Organophosphorus compound
Group 6: Paracetamol poisoning
Group 7: Cleistanthus collinus poisoning
Group 8: Tricyclic antidepressants

References:

ADVERSE DRUG REACTION MONITORING AND CAUSALITY ASSESSMENT

OBJECTIVES:

At the end of the practical group work the student shall be able to:

1. Define pharmacovigilance and list the sources of ADR reports.
2. Appreciate the importance of ADR monitoring.
3. Understand the concept and organization of National Pharmacovigilance Programme of India.
4. Report an ADR to a monitoring centre.
5. Understand the concept of causality assessment, its advantages and limitations.
6. Do the causality assessment analysis.

1. A faculty member will briefly introduce the topic. He/she will explain the history of ADRs, current problems of ADR (how ADRs may lead to withdrawal of drug from the market, dosage change or restricted prescription etc..), how to assess causality of adverse events and also the National Pharmacovigilance Programme of India. They will be taken to ADR monitoring centre.

2. Group tasks will be distributed. About one hour will be allocated for the group tasks. At the end of one hour a plenary session will be held where different groups will present their findings.

GROUP TASKS

1. List the sources of ADR reports and the types of ADRs likely to be revealed from them.

2. Fill up the ADR monitoring forms based on the information available in the hospital record of a patient. You are provided with (a) A patients' hospital record (given below) (b) ADR monitoring forms from the ADR monitoring centre [yellow form and red form (Annexure – 3)].

3. Assess the causality for the given case scenarios according to WHO scale. (Annexure - 4).
Name of the patient: Shiv Kumar
Age : 30 years
Sex : Male
Height : 6 feet, Weight: 60 Kg.
Hospital registration No: 25098
Date : 11. 06. 2011
Diagnosis : Essential hypertension
General physical examination: Patient healthy, well oriented in time & space, no jaundice, JVP normal
Vitals: Pulse - 70/min
Respiratory rate - 16/min
temp. afebrile
BP 150/100 mm Hg (rt. arm supine)
Systemic examination: Resp.system – normal CVS - normal
Past history _ No history of allergy No family history of diabetes or hypertension
Lab. investigation: Hb - 16 gm% TLC - 6000/cu mm Serum cholesterol- 200 mg %
Treatment: given on 11. 06. 2011
Tab. Prazosin (minipress) 1mg  B.D.
Tab. Hydrochlorothiazide 25 mg O.D.
After one week treatment patient felt dizzy and fell down in the bathroom and sustained superficial scalp injury. The dose of Prazosin was reduced to 0.5 mg after checking the BP standing. (standing BP 100/70 mm Hg).

(Sgd) JOHN SMITH
Associate Professor

References:
Yellow form, Forms from other centres, ADR form from JIPMER (Appendix-3)
Case scenarios on causality assessment of adverse drug reactions using WHO scale

1. A 52 year old male patient who was diagnosed as hypertensive and started on T.Amlodipine 10mg BD. After 1 week he developed edema over the ankles. Amlodipine was withdrawn and he was started on T.Losartan 50mg OD. Ankle edema resolved. Assess the causality of this ADR

2. A 35yrs old female patient was diagnosed to have GTCS. She was started on T.phenytoin 100 mg BD for 5 months. Recently she developed gum hypertrophy which subsided by discontinuation of the drug. Then T.phenytoin was replaced by T.phenobarbitone. Do the causality assessment for this case.

3. A 35 years old lady developed symptoms and signs of Urinary tract infection for which she was given Inj.Ciprofloxacin. She developed pain and erythematous rash at the site of injection with in 15 min. The reaction reappeared after second dose also. Comment on this ADR scenario and make causality assessment for the same.

4. A 9 years child was diagnosed as a case of pulmonary tuberculosis(smear positive).He was started on HRZE regimen for initial intensive phase of 2 months, drugs being given 3 times per week (Isoniazid-150mg/day, Rifampicin-300mg/day, Pyrazinamide-750mg/day, Ethambutol-450mg/day). At the end of 6 weeks he started developing symptoms of diminution of vision. On ophthalmologic examination he was diagnosed to have optic neuritis, but all drugs were continued to finish the intensive phase of 2 months and then switched to HR regimen at the same dose, vision started improving. Discuss causality assessment.

5. A 64 years old male was diagnosed as a case of carcinoma testis 1 year back and was started on chemotherapy with cisplatin, etoposide and bleomycin. Patient developed continuous nausea and vomiting. After completing first cycle it was subsided and reappeared during second cycle. Do the causality assessment for this case.

6. A 25year female diagnosed to have systemic lupus erythematoses started on prednisolone 10 mg BD. Her serum creatinine level was 1.8 after 3 days. Do the causality assessment for this case.
MEDICAL ETHICS AND INFORMED CONSENT FOR RESEARCH ON HUMANS

OBJECTIVES:

At the end of the session a student shall be able to:

1. List the principles of medical ethics and understand their importance in relation to the practice of medicine

2. Appreciate the history and ethics behind seeking informed consent.

3. Understand the components of an informed consent form and realize its medico-legal implications.

4. To recognize the specific vulnerable groups (children, mentally ill patients etc.,) where informed consent has to be sought from the guardian.

5. Realize the extent to which unethical practices may result in curbing the professional freedom enjoyed by doctors.

A brief introduction covering the universal principles of ethics and its application to medicine will be given. The ethics of research in humans, history behind the Helsinki Declaration and the need to safeguard scientific and personal interests prior to commencement of any research in humans is explained. You will be divided into small groups and assigned a group task (20 minutes). Each group should do a single task. At the plenary, other groups will be asked to list the positive and negative points of the presentation.

Role play: The teacher will ask one of the students to get informed consent from another student in the form of a role play.

Video film: A video film "Sweetening the medicine" will be shown and you are expected to voice your comments as to what you think of unethical drug promotional practices and the behaviour of doctors who fall a prey to such inducements from pharmaceutical companies.

GROUP TASK

Design an informed consent form for a volunteer to take part in the study of a drug (brief protocol given below). Explain the necessity of including each component.

ANALGESIC EFFICACY AND PHARMACOKINETICS OF BUPRENORPHINE

A double blind placebo-controlled clinical trial to document the analgesic efficacy and pharmacokinetics of buprenorphine is to be conducted on patients with post-operative pain. Each patient will receive either the placebo or the drug in a random manner. The drug is to be given sublingually after the operation. 5ml of blood will be withdrawn every 15 mins for the first hour and then hourly for the next 6 hours by means of an in-dwelling cannula. Urine will be collected every two hours. Pain will be assessed using a visual analog scale in the same time schedule.
The following components should be present in an informed consent form:

a) Name & Designation of investigator
b) Institute where the study will be carried out
c) Name & address of the patient
d) Age sex & hospital number
e) Title of the study
f) Procedure in layman's language
g) Option to opt out of the study
h) Care will not suffer if he opts out.
i) Adverse effects (known and unknown)
j) Signatures

Sample of an informed consent form - please see Annexure - 5

INDIVIDUAL TASKS

Discuss the following scenarios and indicate which ethical principle has been violated.

1. A new NSAID has been introduced to the market. Its ADR profile has not been investigated adequately. The drug company marketing the NSAID gives you 1000 tablets as sample and asks you to try out the drug on 50 patients. You are also informed that you can present your findings at an international conference to be held after 2 months in U.S.A. Expenses for you and your spouse will be paid for by the company. You agree, and start using the drug on patients who attend the PHC where you work but not on patients who come to your private clinic.

2. The hospital has a cadaver-organ-donor programme. All doctors are encouraged to get prior permission from the relatives of the dead person prior to removing any organ. However, most people refuse on religious grounds. The doctors are under pressure from the administration and hence remove the corneas without the knowledge of the relatives since removal does not effect the presentation of the cadaver. Comment.

3. A new US based Drug Company discovered a new compound effective for the treatment of Acquired Immunodeficiency Disease Syndrome (AIDS). The company had decided to conduct a clinical trial of the new compound in patients from selected countries of Africa. The drug was considered to be curative to the condition and issued to patients recruited to the study. The study was discontinued as the drug caused serious hepatoxicy and the patients who suffered the adverse reactions were not given proper care and management. Comment on this situation and violation of the principles of ethics.

4. A scientist was doing work on perinatal transmission of HIV. He wanted blood samples from the infant and the mother. Since all the women admitted for labor had to give a sample of blood for various tests, the patients were not informed of the tests being done for HIV but additional blood was drawn from them.

5. A study on gastric carcinoma was being conducted. All patients coming to the surgery OPD with complaints of dyspepsia were subjected to endoscopy and gastric biopsy after taking informed consent that the test may reveal a malignancy. From each patient 12 biopsy samples were collected (normally 3-4 are taken).
6. The Head of the Department of Pharmacology wanted to conduct a bioavailability study on a well known antibiotic. He asked the undergraduate (3rd and 4th semester) students and PGs to participate in the study as healthy volunteers. Written informed consent was taken from all volunteers.

7. A clinical trial on antiretroviral drugs was conducted in AIDS patients from a small slum in Mumbai. The trial was funded by an Organization from a developed country. The drugs were very effective and the interim analysis showed a significant improvement in those treated with the drugs. The study was abandoned immediately and the drugs were used for the treatment of AIDS in the country which funded the research.

8. A study required estimation of neurotransmitters from foetal brain. The investigator collected brains of aborted foetuses. No permission was sought from the parents of the aborted foetuses.

9. A study comparing the antidepressant effect of a drug and electroconvulsive therapy was done on major depressives. Informed consent on behalf of the patients was taken from whoever brought the patient to the hospital.

10. A trace element was to be tried for its effect on pregnancy induced nausea and vomiting. Animal studies showed no teratogenic or toxic effects. Educated women in their first trimester were enrolled for the study. All gave written informed consent.
RANDOMIZED CONTROLLED CLINICAL TRIALS

OBJECTIVES:

At the end of the session a student shall be able to:

1. Understand the rationale of a double-blind randomized controlled clinical trial (RCT) and the need to be able to assess the quality of a trial in order to evaluate newer drugs and therapies.

2. Recognize the elements of a RCT and realize the importance of each.

3. Critically analyze a RCT with respect to each of its elements.

An introductory class will be taken on RCT for the whole class (two and a half hours). Then the class will be divided into 2 batches and each batch into a further 5 groups. Each group (5-6 students) will be given a group task. Preparation time - one to two weeks. Students are expected to do a literature search and get the help of faculty. Plan a clinical trial based on the guidelines given below. At the next class (after one – two weeks), the plenary will take place (two and a half hours).

Task: Write a protocol for a clinical trial using the guidelines given below.

Title:
Introduction: (brief, justification and problem definition)
Hypothesis:
Aims and Objectives:
Materials & Methods:
   (a) Type of Study:
   (b) Setting :
   (c) Subjects :
   (d) No. of Groups:
   (e) Sample size calculation:
   (f) Study design:
   (g) Treatment:
   (h) Primary outcome measure:
   (i) Secondary outcome measures:
   (j) Stopping rule:
   (k) Analysis:
   (l) Ethics :

GROUP TASKS

Please Note: DRUG NAMES, SITUATIONS and DATA described here are HYPOTHETICAL.

Use the guidelines given above for designing a trial for the situation described below.

Group 1
Design a randomized controlled trial to establish the efficacy of a new antihypertensive named HYPOPRIL which belongs to ACE inhibitor group of drugs.
Results of open trial:

- **n=50**
  - maximum daily dose = 5 mg o.d.
  - Mean (SD) reduction in diastolic BP = 30(21.4) mmHg

**Group 2**

In an open trial, propranolol was found to be effective in preventing migraine. Design a randomized controlled trial to confirm the finding.

Results of open trial:

- **n=32**
  - Propranolol prevented migraine in 17 subjects.

**Group 3**

You are approached by a drug company to carry out a randomized controlled trial on a new antipyretic agent named METACETAMOL. How will you design a study?

Results of previous trial in patients:

- **n= 10**
  - Maximum oral dose (200 mg)
  - Mean (SD) duration (h) for which patients maintained normal temperature =5(3.87)

**Group 4**

A herbal drug used by a ayurvedic physicians for chronic insomnia is reported to be effective by the patients. The drug is derived from a plant called SUGANITHRA and is in use for more than a century. Design a randomized controlled clinical trial to find out its efficacy.

Results of open trial:

- **N=20**
  - Maximum oral dose (1g)
  - Mean (SD) increase in sleeping hours = 5(3.27)

**Group 5**

A few case reports suggested that prazosin is effective in preventing carditis due to scorpion sting in children under seven. You are asked to conduct a randomized controlled trial to explore the usage of prazosin in the above condition. How will you proceed?

Note: With conventional treatment(steroids) only 20% children do not develop carditis.

See Appendix - 5 for checklist, nomogram, and table to choose statistical test
OBJECTIVES:

At the end of the practical session the student will be able to:

1. List the criteria for acceptability of fixed dose drug combinations.
2. Enumerate the advantages and disadvantages of fixed dose drug formulations.
3. Critically analyze the contents of some commonly used formulations on the basis of the acceptable criteria for fixed-ratio drugs and argue the absence of scientific rationale in their use.

A faculty member will introduce this subject for 10 mins. Each batch is divided into smaller groups of 5-6 students each and group tasks will be given. At the end of 45 minutes a plenary will be held for one and a half hours.

Group 1:

List the fixed dose drug combinations approved by WHO and give the rationale behind the use of each one.

Group 2:

What are the advantages and disadvantages of fixed dose drug formulations?

Group 3:

Give the pharmacological rationale/or lack of it for the following drugs marketed as fixed dose drug combinations:

1) Amoxicillin 250 mg + Cloxacillin 250 mg for Community acquired Pneumonia  
2) Amoxicillin 250 mg + Clavulanic acid 125 mg for Staphylococcal induced cellulitis  
3) Imipenem 500mg + cilastatin 500 mg for Pseudomonas induced septicemia

Group 4:

Give the pharmacological rationale/or lack of it for the use of the following drugs in a fixed dose formulation:

1) Paracetamol 325 mg + Ibuprofen 400 mg for Typhoid
2) Chlorpheniramine maleate 4mg + phenylpropanolamine 25 mg + dextromethorphan 10 mg for allergic rhinitis  
3) pantoprazole (as sodium) 20mg (E.C.) + Domperidome SR 30mg tablet for GERD

Group 5:

Give the pharmacological rationale/or lack of it for the following drugs:

1) Hydrochlorothiazide 12.5 mg + metoprolol 100 mg for hypertension  
2) Norfloxacin 400 mg + Tinidazole 600 mg + Loperamide for gastroenteritis  
3) Domperidone 20 mg + paracetamol 500 mg for migraine  
4) Dutasteride 0.5 mg + Tamsulosin 0.5 mg for benign prostatic hypertrophy
GENERAL PRINCIPLES OF ANTIMICROBIAL USE

OBJECTIVES:

At the end of the session the student will be able to:

1. Select appropriate antimicrobials for a given clinical situation.

2. Limit indiscriminate use of broad-spectrum newer agents.

3. Appreciate the common prescribing errors when using antimicrobials.

An introduction will be given (10-15 minutes) on the problems associated with indiscriminate use of broad-spectrum newer agents while a safer, cheaper, effective alternative is available. The batch will be divided into five small groups of 5-6 students in each group. Group tasks will be distributed. After 30 minutes a plenary will be held (90-100 minutes).

Group tasks: Comment on the case studies/problems given below.

Group: 1

(a) A two-and-a-half-years old child is brought by her mother. She is flushed, coughing, has been unwell and lacking appetite for three days. Examination reveals a temperature of 37.8°C and mild pharyngitis. However, the eardrums are normal and the chest is clear. Mother notes that, "the child always does well on Amoxil doctor".

(i) What would you do in this case? (Discuss various options)

(b) Latha, aged 18-months was brought to your office because of ear-ache which had developed the previous night. Latha had a cold for about 5 days. Examination showed a red bulging tympanic membrane.

(i) Are antimicrobials indicated and, if so, why?

Group: 2

(a) Mrs. Nirmala, aged 24 presented with an acute four hour history of increased frequency of micturition, dysuria and haematuria. She had not had similar symptoms before, there was no history of drug allergies and she was not pregnant. A urine dip-stick test was positive for protein, blood and nitrates. Urine microscopy showed profuse pus cells and large numbers of bacilli.

(i) Which of these drugs would you consider the most cost-effective treatment for this presumed urinary tract infection? Amoxycillin, amoxycillin with clavulanic acid, cephalexin, nitrofurantoin, norfloxacin, trimethoprim, trimethoprim with sulfamethoxazole (Discuss each drug under clinical efficacy, adverse effects (safety) and cost)

(ii) What should be the duration of treatment for uncomplicated urinary tract infection?
(b) Sumathi aged 10 years was diagnosed as having acute appendicitis. An inflamed appendix was removed with some difficulty. Post-operatively, amoxycillin was ordered for 5 days. Despite this therapy Sumathi became febrile and complained of local pain. When the dressings were removed on the 4th post-operative day a frank wound infection was revealed. Swab culture produced a mixed growth of *Bacteroides fragilis* and *Escherichia coli*.

(i) Can you explain why antimicrobial therapy was not successful?

Group: 3

(a) Shekar, aged 18-months was admitted to a taluk hospital with clinical evidence of meningitis. Lumbar puncture revealed turbid CSF. Benzyl penicillin, 600 mg, was administered intrathecally. Thirty seconds later the child twitched, convulsed and died.

(i) What is the provisional cause of this child's death?

(a) Mary aged 75 years was admitted to the general ward because of a stroke. A urinary catheter was inserted to ease the nursing problem due to urinary incontinence. Two weeks later she was asymptomatic, afebrile but noted to have cloudy urine. A pathology test showed *Escherichia coli* >100,000 cfu/ml, reported sensitive to amoxycillin, trimethoprim, cephalexin, norfloxacin, and gentamicin. She was treated with amoxycillin for 5 days but a repeat urine culture showed that *E.coli* persisted although now it was resistant to amoxycillin, trimethoprim and cephalexin. Therapy was changed to norfloxacin. Four weeks later the urine still showed bacteruria, this time with *Pseudomonas aeruginosa* resistant to norfloxacin and all other oral antibiotics.

(i) How should this case have been managed?

Group: 4

(a) A six year old child was brought to your surgery on account of a graze, sustained three days previously. The lesion (which mother said had increased in size) was partly covered with thick, crusting scab and exuded serous fluid. The surrounding skin was inflamed.

After taking a swab for microbiological examination you would prescribe:

1. phenoxymethylpenicillin
2. amoxycillin
3. erythromycin
4. flucloxacillin
5. doxycycline

(b) Mr. Natesan, aged 72 years, was admitted to your local hospital because of fever, cough, productive sputum and pain in the chest. He has a past history of many episodes of chronic bronchitis and still smokes 20 cigarettes a day, despite advice to cease.

Clinical examination suggested right upper lobe consolidation confirmed by chest X-ray. Blood examination showed a leucocyte count of 22,000/mm$^3$ with 85% polymorphs.

You diagnose pneumonia and order Tab. Azithromycin 500 mg od and Inj. Cefotaxime 1 g i.v. 8$^\text{th}$ hourly. Improvement is slow. A sputum sample is obtained on the third day after admission. On the fourth hospital day, the patient is somewhat better. The leucocyte count is now 15,000 with 90% polymorphs. A repeat chest X-ray shows no change. The preliminary sputum report is now available:
Gram stain: occasional polymorph, scanty mixed Gram positive cocci and Gram-negative bacilli.
Culture: Heavy growth, predominantly *Escherichia coli*

(i) Which of the following seems most appropriate?
1. Continue the present regimen
2. Change to Inj. Ciprofloxacin 200 mg i.v. bd
3. Change to Inj. ampicillin 500mg i.v. 8th hourly with Inj. Gentamicin 80 mg i.v. bd
4. Discontinue cefotaxime

(ii) What other measures would you institute?

Group 5

a) A 50 year old Mr. Ashok Kumar was diagnosed to be suffering from community acquired pneumonia in a tertiary hospital care. He was started on the following drugs on the conventional dosing of Inj. gentamicin 50 mg thrice a day and Inj. ceftriaxone 1 gm given as a single dose once in the morning. The patient had elevated levels of blood urea and creatinine after two days of therapy. How could this patient be managed better?

b) The economic expenses spent towards antibiotic usage were severely curbing the cost effectiveness of utilizing the budget in a tertiary health care. The head of the tertiary care planned to conduct a discussion with various departments to seek out the problem.

A role play:
A panel discussion between professors of microbiology, medicine, surgical department was to be conducted and discuss the problem and measures that can be adopted to control the emergence of resistance and rationale usage of antimicrobials.

c) The following table (based on market-research data) shows how the treatment of tonsilitis has changed over the years.

**Tonsillitis**

**Market share (%) of each antimicrobial drug**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancomycin</td>
<td>12%</td>
<td>24%</td>
<td>37%</td>
</tr>
<tr>
<td>Tigecycline</td>
<td>-</td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>9%</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>Amp/amoxyccillin</td>
<td>72%</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>-</td>
<td>16%</td>
<td>26%</td>
</tr>
</tbody>
</table>

(a) Which of the following influences on prescribing do you believe could have accounted for these changing habits:
1. Microbial susceptibility data
2. Scientific articles in peer-reviewed journals
3. Undergraduate & postgraduate teaching
4. Promotional pressure from pharmaceutical industry
Group 6
a) Mr. Sanjay, 35 years present with weight loss and fever for about two weeks. Examination reveals no clear cause for this and initial examination including chest radiograph are normal, the TLC - 13000 cu mm and ESR is 52 mm/hr. He is prescribed
   Cap Amoxicillin 500 mg TDS
   Tab Ciprofloxacin 500 mg BD
   Comment.

b) Mr. Reynold, 35 years is diagnosed with Acute Myeloid leukemia and is started on daunorubicin and cytarabine. Within 3 days of therapy the patient develops fever, cough with expectoration. Investigation shows the following. Hb- 7 g/dl, TLC – 1000 cumm. ESR -67 mm. Chest X ray shows right upper lobe infiltrates. Comment.

c) Susheel is 10 years old boy who has developed fever and head ache for 2 days. After being admitted and treated in the private clinic for 2 days, he has now been referred to tertiary care hospital as he has developed signs of neck stiffness and projectile vomiting. The patient was started at the time of admission.
   Inj Ciprofloxacin 100 mg IV bd
   Tab Azithromycin 250 mg bd. A lumbar puncture done in the hospital on the second day show clear fluid. CSF analysis reveals mild pleocytosis but gram stain shows no organisms. CSF culture also turns out to be sterile.
   Comment on this situation.
Annexure - 1

DEFINITION OF IMPORTANT DRUG FORMULATIONS

SOLID DOSAGE FORMS

Tablet

(i) **Tablet** may be defined as solid dosage form containing drugs with or without suitable diluents and prepared either by compression or moulding methods.

(ii) **Sugar coated tablets** contains sugar coating—which help to cover up any disagreeable taste or odours of drug. It may be 50% larger and heavier than the original uncoated tablet.

(iii) **Film coated tablets** are covered with a thin layer or film of a water soluble material.

(iv) **Enteric coated tablets** are coated with substances that resist dissolution in gastric fluid but disintegrate in the intestine.

(v) **Sustained release tablets** are formulated to release the known quantum of the drug slowly over a specified prolonged period of time.

(vi) **Effervescent tablets**: They contain sodium bicarbonate and an organic acid such as tartaric or citric acid besides the drug. In the presence of water, these additives react, liberating carbon dioxide which acts as a disintegrator and produce effervescence.

(vii) **Chewable tablets** have a smooth, rapid disintegration when chewed or allowed to dissolve in the mouth, have a flavored cream base.

(viii) **Gel cap**: a recent innovation in tablet coating resembles capsule and facilitates swallowing.

Capsules: They are either hard or soft, soluble dosage forms made of gelatin. Capsules are tasteless and easily administered.

Suppository: It is a cone shaped solid dosage form of various weights, usually medicated, for insertion into the rectum. Following insertion, the suppository melts at body temperature.

Pessary: It is a vaginal suppository and is ovoid in shape with a rounded apex.

Bougies: They are solid pencil shaped body meant for urethral administration.

LIQUID DOSAGE FORMS

Mixture: It is a liquid preparation containing one or more soluble or insoluble ingredients meant for internal use.

Syrup: It is a concentrated sucrose solution in water or other liquids containing the drug.

Elixir: Elixirs are clear, pleasantly flavoured, sweetened hydroalcoholic liquid having active medication intended for oral use. Elixirs contain mainly ethanol and water.

Linctus: Linctus is a viscous liquid preparation containing high proportion of sucrose. It is usually prescribed for relief of cough and is sipped and swallowed undiluted.

Emulsion: Emulsion is a mixture of two immiscible liquids, one of which is dispersed uniformly throughout the other with the help of an emulsifying agent.

Suspension: A suspension is a liquid medicament containing insoluble (diffusible or indiffusible) solid substances which are homogenously distributed throughout the vehicle with or without the help of a suspending agent.
PARENTERAL DOSAGE FORMS

It refers to drug formulations that are administered mainly by injections (other than via alimentary tract)

- Intradermal: e.g. BCG, penicillin sensitivity
- Subcutaneous: e.g. insulin, heparin
- Intramuscular: e.g. diclofenac, TT
- Intravenous: e.g. i.v. fluids, antibiotics

TOPICAL DOSAGE FORMS

They are intended for localized effect produced at the site of their application by virtue of drug penetration into the underlying layers of skin or mucous membrane.

Lotion

Lotion is a liquid suspension intended for external application. e.g. calamine lotion

Liniment

Liniment is a liquid preparation intended for external application, applied on unbroken skin with friction. e.g. turpentine liniment

Ointment

Ointment is a semisolid preparation containing less than 10% powdered ingredients, intended for external application to skin or mucous membrane. e.g., Whitfield ointment

Paste

Paste is a semisolid preparation intended for external application, containing more than 10% of the powdered ingredients. e.g., zinc oxide paste

Cream

Cream is a viscous liquid or semisolid emulsion of either oil in water or water in oil. e.g., clotrimazole cream

Paint

Paint is a liquid preparation intended for applications to skin or mucous membrane. e.g., throat paint (Mandl’s paint), astringent gum paint.

INHALATION DOSAGE FORMS

They contain drug particle or solutions administered by respiratory route for local or systemic effects.

Metered dose inhaler (MDI): it is pressurized dosage form containing one or more drugs which upon actuation emit a fine dispersion of liquid in gaseous medium. A metered valve is used to regulate the amount of drug discharged. e.g., salbutamol inhaler, beclomethasone inhaler

Dry powder inhaler: It delivers a measured dose of the drug in a powdered form for inhalation. It is suitable dose for patients having difficulty with MDI. e.g., salbutamol rotahaler

Nebuliser: It is a device for the inhalation of drug solutions as droplets suitable for use in children and in emergencies. e.g., salbutamol solution
## Annexure - 2

### ACCEPTED ABBREVIATIONS FOR WRITING PRESCRIPTION

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.c.</td>
<td>Before meals</td>
</tr>
<tr>
<td>p.c.</td>
<td>After meals</td>
</tr>
<tr>
<td>o.m</td>
<td>Every morning</td>
</tr>
<tr>
<td>h.s.</td>
<td>At bedtime</td>
</tr>
<tr>
<td>o.d</td>
<td>Once a day</td>
</tr>
<tr>
<td>b.i.d. or b.d</td>
<td>Twice a day</td>
</tr>
<tr>
<td>t.i.d or t.d.s</td>
<td>Three times a day</td>
</tr>
<tr>
<td>q.i.d or q.d.s</td>
<td>Four times a day</td>
</tr>
<tr>
<td>q4h or q.q.h</td>
<td>Every four hours</td>
</tr>
<tr>
<td>non.rep</td>
<td>Do not repeat</td>
</tr>
<tr>
<td>stat</td>
<td>Immediately</td>
</tr>
<tr>
<td>Tab</td>
<td>Tablet</td>
</tr>
<tr>
<td>Cap</td>
<td>Capsule</td>
</tr>
<tr>
<td>Inj</td>
<td>Injection</td>
</tr>
</tbody>
</table>
Causality assessment

Causality assessment is the method by which the extent of relationship between a drug and a suspected adverse event is established.

Currently wide variety of causality assessment scales exists, to attribute clinical events to drugs in individual patients or in case reports, each with their own advantages and limitations. These scales include:

1. WHO causality assessment scale
2. Naranjo’s algorithm
3. Karch & Lasagna scale
4. Spanish quantitative imputation scale
5. Kramer’s scale
6. Jones scale
7. European ABO system
8. Bayesian system.

The Naranjo’s algorithm and the WHO scale of assessment are the most commonly used scales.

**NARANJO’s ALGORITHM**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there previous conclusion reports on this reaction?</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Did the adverse event appear after the suspect drug was administered?</td>
<td>+2</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Did the adverse event improve when the drug was discontinued or a specific antagonist was administered?</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Did the adverse event reappear when drug was readministered?</td>
<td>+2</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Are there alternate causes [other than the drug] that could solely have caused the reaction?</td>
<td>-1</td>
<td>+2</td>
<td>0</td>
</tr>
<tr>
<td>Did the reaction reappear when a placebo was given?</td>
<td>-1</td>
<td>+1</td>
<td>0</td>
</tr>
<tr>
<td>Was the drug detected in the blood [or other fluids] in a concentration known to be toxic?</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Was the reaction more severe when the dose was increased, or less severe when the dose was decreased?</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Did the patient have a similar reaction to the same or similar drugs in any previous exposure?</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Was the adverse event confirmed by objective evidence?</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**SCORING FOR NARANJO’s ALGORITHM**

- > 9 = definite ADR
- 5-8 = probable ADR
- 1-4 = possible ADR
- 0 = doubtful ADR
## WHO SCALE OF CAUSALITY ASSESSMENT

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. CERTAIN</strong></td>
<td>A clinical event, including laboratory test abnormality, occurring in a plausible time relationship to drug administration, and which cannot be explained by concurrent disease or other drugs or chemicals. The response to withdrawal of the drug (dechallenge) should be clinically plausible. The event must be definitive pharmacologically or phenomenologically, using a satisfactory rechallenge procedure if necessary.</td>
</tr>
<tr>
<td><strong>2. PROBABLE/LIKELY</strong></td>
<td>A clinical event, including laboratory test abnormality, with a reasonable time sequence to administration of the drug, unlikely to be attributed to concurrent disease or other drugs or chemicals, and which follows a clinically reasonable response on withdrawal (dechallenge). Rechallenge information is not required to fulfil this definition.</td>
</tr>
<tr>
<td><strong>3. POSSIBLE</strong></td>
<td>A clinical event, including laboratory test abnormality, with a reasonable time sequence to administration of the drug, but which could also be explained by concurrent disease or other drugs or chemicals. Information on drug withdrawal may be lacking or unclear.</td>
</tr>
<tr>
<td><strong>4. UNLIKELY</strong></td>
<td>A clinical event, including laboratory test abnormality, with a temporal relationship to drug administration which makes a causal relationship improbable, and in which other drugs, chemicals or underlying disease provide plausible explanations.</td>
</tr>
<tr>
<td><strong>5. CONDITIONAL/UNCLASSIFIED</strong></td>
<td>A clinical event, including laboratory test abnormality, reported as an adverse reaction, about which more data is essential for a proper assessment or the additional data are under examination.</td>
</tr>
<tr>
<td><strong>6. UNASSESSIBLE/UNCLASSIFIABLE</strong></td>
<td>A report suggesting an adverse reaction which cannot be judged because information is insufficient or contradictory, and which cannot be supplemented or verified.</td>
</tr>
</tbody>
</table>
Case scenarios on causality assessment of adverse drug reactions using WHO scale

1. A 48 year male was started on T.Aspirin 75mg/day after the attack of Myocardial Infarction. 3 months after taking the drug he complained of epigastric pain. Assess the causality.

2. A 60 year old hypertensive and diabetic was on T.Enalapril 10mg BD. He developed dry cough after 2 months of taking the drug. It was replaced with T.Losartan 50mg OD. The cough subsided. Assess the causality of this scenario.

3. A 40yrs old unmarried female patient was diagnosed as schizophrenia and started on T.haloperidol 5mg OD. After 2 weeks of therapy, she developed tremors and muscular dystonia. Then T.haloperidol was replaced with T.Olanzepine, symptoms were subsided. Do the causality assessment for this case.

4. A 25 yrs old female patient was diagnosed as GTCS and started on T.valproate 200 mg TDS. Meanwhile she became pregnant. In first trimester USG abdomen showed neural tube defect. T.valproate was replaced with T.phenobarbitone. Do the causality assessment for this case.

5. A 67-year-old woman presented to hospital with rigidity, bradykinesia, tremor, and parkinsonian gait over 2 weeks. History revealed that she was diagnosed to have depression and was on citalopram for 6 months.

6. A 22 years male was on the treatment regimen of dapsone and rifampicin for paucibacillary leprosy. After 6 weeks of treatment he started developing fatigue on minimal exertion. On hematological investigation, Hb-7g%, reticulocyte count-6% and blood picture suggesting hemolytic anemia. Give your opinion regarding causality assessment.

7. A 9 years old male child was diagnosed as a case of acute lymphoblastic leukemia and chemotherapy was given which includes vincristine, l-asparaginase, cytarabine and prednisolone. After a week some of his laboratory data were as given below,

   Serum amylase = 260 U/L (n-20 to 96 U/L)
   Serum lipase = 150 U/L (n-3 to 43 U/L)
   Haemoglobin = 11.6 gm/dl
   Total leucocyte count = 6900 cells /cu mm
   Platelet count = 1.3 lacs/cu mm
   Chemotherapy was not stopped. Do the causality assessment for this case.

8. A 45 years old female was diagnosed as a case of rheumatoid arthritis 1 year back and was taking NSAIDS but her condition was not improving. She was started on tab.Methotraxate. She was on regular blood monitoring. After 2 weeks her Hb – 8g/dl and peripheral blood smear shown anisocytosis, poikilocytosis, macrocytes. The drug was stopped and within a month the blood report was normal. Do the causality assessment for this case.

9. A 73-year-old woman with a history of deep venous thrombosis of the lower limbs was treated with sunitinib for renal cancer with hepatic and pulmonary secondaries. While on this treatment, she developed painful ulcers of the right lower limb, despite having never previously presented leg ulceration. On discontinuation of sunitinib, the lesions improved, and resumption of this drug, even at a lower dosage, resulted in relapse of her ulcers.

Dept. of Pharmacology, JIPMER
Annexure: 5
Form IA

Proforma to be submitted to the JIPMER Institute Ethics Sub-Committee (Human Studies) for MD/MS/DM/M.Ch/Ph.D/MSc Students (for Thesis or Dissertation)/MBBS student projects

Kindly submit 5 copies of proforma and consent forms in 2 parts (in English and Tamil) to the Member Secretary, Ethics (Human) committee, JIPMER, Puducherry

1. Title of the project:
2. Name and department/address of the investigator:
3. Name of Faculty (Guide/Co-guide) with designation & department:
4. Date of approval by JIPMER Research Council:
5. Sources of funding
6. Objectives of the study:
7. Justification for the conduct of the study:
8. Methodology: It should provide details of number of patients, inclusion criteria, exclusion criteria, control(s), study design, dosages of drug, duration of treatment, investigations to be done etc.
9. Permission from Drug Controller General of India (DCGI) if applicable
10. Ethical issues involved in the study:
   (Less than minimal risk/minimal risk/more than minimal risk to the study subjects (for guidance please consult ICMR guidelines - at JIPMER website)
11. Do you need exemption from obtaining Informed Consent from study subjects – if so give justifications
12. Whether Consent forms part 1 and 2 in English and in local language are enclosed?
13. Conflict of interest for any other investigator(s) (if yes, please explain in brief)
14. We, the undersigned, have read and understood this protocol and hereby agree to conduct the study in accordance with this protocol and to comply with all requirements of the ICMR guidelines (2006)

Signature of the Investigators: Date:

Signature of the Head of the Department Date:

(Note: The proforma must be accompanied by Consent forms I & II in English and Tamil. Consent form I is equivalent to Patient Information Sheet. The investigator must provide information to the subjects in a simple language, and it should address the subjects, in a dialogue format)
CONSENT FORM I
INFORMATION FOR PARTICIPANTS OF THE STUDY

Instructions - This is the patient information sheet. It should address the participant of this study. Depending upon the nature of the individual project, the details provided to the participant may vary. A separate consent form for the patient/test group and control (drug/procedure or placebo) should be provided as applicable. While formulating this sheet, the investigator must provide the following information as applicable in a simple language in English and Tamil which can be understood by the participant

- Title of the project
- Name of the investigator/guide
- Purpose of this project/study
- Procedure/methods of the study
- Expected duration of the subject participation
- The benefits to be expected from the research to the participant or to others and the post trial responsibilities of the investigator
- Any risks expected from the study to the participant
- Maintenance of confidentiality of records
- Provision of free treatment for research related injury
- Compensation of the participants for disability or death resulting from such injury
- Freedom to withdraw from the study at any time during the study period without the loss of benefits that the participant would otherwise be entitled
- Possible current and future uses of the biological material and of the data to be generated from the research and if the material is likely to be used for secondary purposes or would be shared with others, this should be mentioned
- Address and telephone number of the investigator and co-investigator/guide
- The patient information sheet must be duly signed by the investigator
CONSENT FORM II
PARTICIPANT CONSENT FORM

Participant's name:                        Address:

Title of the project:

The details of the study have been provided to me in writing and explained to me in my own language. I confirm that I have understood the above study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without the medical care that will normally be provided by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the above study.

Signature of the participant: ______________________ Date: _____________

Signature of the witness: ________________________ Date: _____________

(Note: Consent form II should be appropriately worded for adults and children (less than 18 years) e.g. If the participant is less than 18 years of age, instead of ‘my participation’, ‘my child’s/ward’s participation’ needs to be replaced.)
# SELECTING A STATISTICAL TEST

<table>
<thead>
<tr>
<th>Goal</th>
<th>Type of Data</th>
<th>Rank, Score, or Measurement (from Non-Gaussian Population)</th>
<th>Binomial (Two Possible Outcomes)</th>
<th>Survival Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe one group</td>
<td>Measurement (from Gaussian Population)</td>
<td>Mean, SD</td>
<td>Median, interquartile range</td>
<td>Proportion</td>
</tr>
<tr>
<td>Compare one group to a hypothetical value</td>
<td></td>
<td>One-sample t test</td>
<td>Wilcoxon test</td>
<td>Chi-square or Binomial test</td>
</tr>
<tr>
<td>Compare two unpaired groups</td>
<td></td>
<td>Unpaired t test</td>
<td>Mann-Whitney test</td>
<td>Fisher’s test (chi-square for large samples)</td>
</tr>
<tr>
<td>Compare two paired groups</td>
<td></td>
<td>Paired t test</td>
<td>Wilcoxon test</td>
<td>McNemar’s test</td>
</tr>
<tr>
<td>Compare three or more unmatched groups</td>
<td></td>
<td>One-way ANOVA</td>
<td>Kruskal-Wallis test</td>
<td>Chi-square test</td>
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<tr>
<td>Compare three or more matched groups</td>
<td></td>
<td>Repeated-measures ANOVA</td>
<td>Friedman test</td>
<td>Cochrane Q</td>
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<tr>
<td>Quantify association between two variables</td>
<td></td>
<td>Pearson correlation</td>
<td>Spearman correlation</td>
<td>Contingency Coefficients</td>
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<tr>
<td>Predict value from another measured variable</td>
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<td>Simple linear regression or Nonlinear regression</td>
<td>Nonparametric regression</td>
<td>Simple logistic regression</td>
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<tr>
<td>Predict value from several measured or binomial variables</td>
<td></td>
<td>Multiple linear regression* or Multiple nonlinear regression</td>
<td></td>
<td>Multiple logistic regression</td>
</tr>
</tbody>
</table>
Annexure - 7

DEPARTMENT OF PHARMACOLOGY
JIPMER, PUDUCHERRY-6

REQUISITION FORM FOR DRUG MONITORING

A. Patient’s Name Inpatients/Outpatient:
   Age:
   Hospital No.:
   Sex:
   Unit/Ward No.:
   Weight:
   Address:

B. Diagnosis

C. Check the investigation required:
   1. Phenytoin
   2. Phenobarbitone
   3. Carbamazepine
   4. Digoxin
   5. Theophylline
   6. Paracetamol
   7. Salicylic acid
   8. Sodium valporate
   9. Urinary VMA

D. Drug History
   Dose given: _______________ times/day Route: _______________
   Treatment started on: _______________ Time: _______________
   Last dose given at: _______________ Time: _______________
   Total duration of treatment: _______________
   Sample collection on: _______________ Time: _______________

E. Reason for estimation: Drug Toxicity/ Failure of treatment

F. List of other drugs given, their dosage and duration:

Date: ___________________________ Signature of the HOD/Unit
   (Name in block letters)

Note: Please contact HPLC laboratory for details regarding collection of samples, assay schedule, report etc. For sample collection please send the patient (OPD patient only) along with this form to HPLC laboratory, Dept of Pharmacology, III Floor, Institute block between 9:30 AM to 3:30 PM.
Annexure – 8

Drug Regulatory Act and Schedules

The Government of India has promulgated Drugs and Cosmetics Act long before to regulate the import, manufacture, distribution and sale of drugs. However, subsequent amendments for this act have been passed from time to time as per the requirements. The following drug schedules are important for physicians which are prescription elated schedules.

1. **Schedule H** (prescription drugs)
   Drugs included in this schedule are sold by retailers only on production of valid prescription given by a registered medical practitioner.

2. **Schedule W**
   This includes only few drugs that shall be marketed under generic names only. For example analgin, aspirin, chlorpromazine, ferrous sulphate and piperazine.

3. **Schedule X**
   Drugs having dependence liability are included in this schedule. Strict directions are given regarding labeling, prescription, storage and sale of these drugs. These drugs must be stored under lock and key in a safe so that only responsible persons will have access. Importantly, the supply of these drugs has to be maintained and recorded in a register.

4. **Schedule G**
   This provides list of drug preparations with a label that states “Caution: It is dangerous to use this preparation except under medical supervision”.

5. **Schedule J**
   This is an informative schedule which gives the list of ailments for which no drug should claim prevention or cure. For example HIV and atherosclerosis.

6. **Schedule K**
   This defines the conditions under which certain circumstances registered medical practitioners and hospitals are exempted from provisions as given in Chapter IV of Drugs and Cosmetics Act 1940 of India.

7. **Schedule C**
   This appraises the clinical values of biologicals and other special products. For example vaccines, sera, insulin and antibodies.

8. **Schedule F**
   This depicts specifications for standard ophthalmic preparations.

PRESCRIPTION WRITING AND PROBLEM SOLVING

Cardiovascular system

1. Mr. Rameez, a 47-year-old man, is diagnosed with essential hypertension. The average BP from 3 consecutive readings is 162/94 mm Hg. Prescribe suitable drugs for this patient.

2. Mrs. Meghana, a 23-year-old primigravida at 33 weeks, has been diagnosed with pregnancy-induced hypertension. She has bilateral pitting pedal edema. The patient is admitted to the hospital and is given the following medication.
   1) Tab Indapamide 2.5 mg od.
   2) Tab Losartan 50 mg od.
   Comment and rewrite the above prescription.

3. A 52-year-old diabetic Mr. Kannan was well controlled with Tab. Glibenclamide 5 mg bd. In a routine medical checkup, he was diagnosed to have hypertension and the physician prescribed him Tab. Propranolol 20 mg bd and Tab. hydrochlorothiazide 25 mg bd. Comment, correct (if necessary) and rewrite the prescription.

4. Mr. James, 50 years, is a patient with chronic rheumatic heart disease who was on treatment for last one year. He now presents to the casualty with acute pulmonary edema due to poor adherence to medication. The patient is given the following drugs. Indicate whether the choice of the drugs given are rational with reasons for the same.
   a. Inj Frusemide 40 mg IV stat.
   b. Inj Mannitol 100 mg IV stat
   c. Cap Nitroglycerin sublingual 0.4 mg stat

5. Mr. Rendir, 64 years of age, is discharged from the hospital following treatment for acute myocardial infarction. He was on irregular treatment for hypertension for 2 years prior to this event. He is a non-smoker, does not have diabetes, obesity or dyslipidaemia. He is prescribed the following drugs at discharge.
   a. Tab Metoprolol 200 mg TDS
   b. Tab Alprazolam 5 mg hs
   c. Tab Isosorbide dinitrate 10 mg sos
   Comment, correct and rewrite the above prescription.

6. A 52-year-old ischemic heart disease patient who is already on Tab. aspirin 165 mg od and Tab. isosorbide dinitrate 10 mg tds is diagnosed to have hypertension in a routine medical check-up. He was prescribed Tab. nifedipine 10 mg tds and Tab. hydralazine 25 mg bd. Comment, correct (if necessary - the second prescription without altering the first) and rewrite the prescription.

7. A 40-year-old patient suffering from essential hypertension (BP 150/100 mmHg Rt Arm supine) and angina pectoris was prescribed the following drugs
   Tab. Hydralazine 25 mg tds
   Tab. Isosorbide dinitrate 10 mg tds
   Tab. Ibuprofen 400 mg tds
   Comment, correct and rewrite the above prescription in corrected form.

8. Meenakshi, 33 years of age, is a known case of rheumatic heart disease, moderate mitral stenosis on Tab Phenoxymethylpenicillin 250 mg BD and Tab Frusemide 40 mg BD. She comes now to OPD for routine follow up and tells the physician that she has dyspnea and leg swelling. ECG does not show atrial fibrillation. Echocardiography shows 40% ejection fraction without any worsening of her primary lesion. She is prescribed the following:
   Tab. Digoxin 1 mg b.d X 30 days
   Tab. Spironolactone 25 mg BD X 30 days
   Comment, correct and rewrite the above prescription.
9. A patient 55 years of age with heart failure due to mitral stenosis who was on Tab Digoxin 0.5 mg od and Tab Metolazone 5 mg od and Tab Frusemide 40 mg od. feels lethargic and complains of nausea and vomiting, visual disturbances. His pulse is 58/min, BP 122/90 mmHg, RR 34/min. Routine investigations reveal the following. Blood urea –28 mg/dl, Random blood sugar 112 mg/dl, Serum creatinine 2.9 mg/dl, Sodium 128 meq/L, Potassium 2.8 mEq/L, Chloride 98 mEq/L, Bicarbonate 24 mEq/L.

What is the role for digoxin in the treatment of heart failure at present?
What was the predisposing factor for digoxin toxicity in this patient?
How will you diagnose and treat digoxin toxicity?

10. A 45 year old, Mr. Bhaskar, an obese person, was asked to test for lipid profile. The report showed elevated total cholesterol and LDL while HDL, VLDL and TGs were normal. After counseling for lifestyle and dietary changes also he was found to be overweight. He also told that his mother died of myocardial infarction before 50 years of age. Prescribe suitable drugs for this patient.

11. A 60 year old woman is seen in the emergency dept with quadriparetesis developed over the last two weeks. She is a known case of hypertension on Tab Hydrochlorthiazide 25 mg BD, Tab Frusemide 40 mg OD and Tab bisacodyl 10 mg HS. Routine ECG reveals characteristic abnormalities. What is the diagnosis? How can it be treated? How could it have been prevented in this patient?

**Blood & Autacoids**

12. A 20 year old girl Ms. Kala presented to your clinic with the complaints of nasal congestion, running nose, paroxysms of sneezing associated with nasal itching, eye irritation and sometimes chest tightness also. Detailed history reveals that she is exposed to airborne dusty material in her workplace. She gets repeated attacks whenever she is exposed to dust in her workplace. Physical examination of the nasal cavity reveals a pale, edematous and inflamed nasal mucosa. Prescribe suitable drug(s) for this patient.

13. Mrs. Sumathi, 30 year old lady was referred to a tertiary care center for post partum hemorrhage after her delivery in a nearby urban health center. The referral slip revealed the lady had suffered from pregnancy induced hypertension and the following drugs were administered to the lady for the management of post partum hemorrhage.
   1. Inj Ergometrine 2 mg IM stat
   2. IV Fluids- Ringer Lactate 1 liter infused in 2 hours. Comment on the medications administered.

14. A 23 year old lady married for three months was prescribed Tab. Ergometrine 500 mcg for the management of migraine. Comment, correct and rewrite the above prescription.

15. Mr. Ramesh, 55 years old hypertensive, diabetic patient underwent coronary angioplasty and was prescribed the following drugs.
   1. Tab. Enalapril 5 mg once daily
   2. Tab Aspirin 150 mg once daily
   3. Tab Clopidogrel 150 mg o.d.
   4. Tab Metformin 500mg b.d.
   The patient complained of severe epigastric pain and the general practitioner has added Cap. Omeprazole 40 mg b.d. to his prescription. Comment on the prescription.

Dept. of Pharmacology, JIPMER
16. A 23 year old patient Mrs. Mahalakshmi, in her 1st trimester was found to be slightly anemic on routine check up. Her hemoglobin was found to be 10 g/dl, blood smear showed macrocytic anemia. Further blood tests showed a normal serum concentration of vitamin B12. Prescribe suitable drug(s) for this patient.

17. A 52 year old woman Mrs. Mallika presented with pain, redness and warmth over her first toe. Laboratory examination of fluid taken from inflamed joint revealed crystals of uric acid and she was diagnosed to have acute gout. Prescribe for this patient.

18. Thirty years old female patient presented with the complaints of easy fatigability, and tiredness. Examination revealed pallor and a hemoglobin of 10 g%. Peripheral smear shows microcytic hypochromic anemia. Prescribe suitable drug(s) for this patient.

19. Prescribe for a 26 year old woman with uncomplicated pregnancy of 16 weeks with a hemoglobin level of 9 g% and microcytic hypochromic anaemia.

20. Mr. Senthil, a 24 year old male presented with symptoms of fatigue and body ache. His hemoglobin was 8.5 g% and his peripheral smear showed megaloblasts. He was treated with folic acid 5 mg OD for 2 months. He returned back with worsening of lower limb cramps and his peripheral smear showed normal RBC's. Comment, correct and rewrite the above prescription.

21. Prescribe for a 28 year old woman with 4 month history of left-sided pulsatile headache occurring at least once a week. Her headache is usually preceeded by flashes of light and a sensation of nausea and light headedness. Her headache is not relieved by two tablets of either aspirin 325 mg or ibuprofen 200 mg and generally lasts throughout the day unless she lies in a dark room and sleeps. Her medical history is unremarkable and she is not taking any medications on a chronic basis.

22. A 42 year old woman presents to the casualty with acute dyspnea. She gives history of travelling in a bus for 10 hours continuously from her native village 3 days ago. On arrival in the casualty she is tachypneic. Her pulse rate is 114 beats/min and resp rate is 30/min, Spo2 is 92% on room air. Her weight is 90 kg. Helical CT shows a pulmonary embolus. She is given Tab Warfarin 5 mg OD to maintain an INR of 2-3. Comment on the prescription.

23. Mr Ganguly, 56 years of age is a known case of hypertension on irregular treatment with tab amlodipine 2.5 mg od for the last 2 years. He has been having running nose, watery eyes and sore throat for the last 2 days. He visits the local pharmacy near his residence and buys some medication to relieve his symptoms. The next morning he is brought by his wife to the hospital where he is diagnosed as hypertensive crisis with an average BP of 200/120 mmHg. (a) What was the reason for the sudden deterioration of his hypertension. (b) Prescribe a suitable drug for his allergic rhinitis.

Gastrointestinal System

24. A 32 year old sales executive presented to your clinic with the complaints of upper abdominal pain. The pain is burning in nature, aggravated by fasting and relieved by taking food. History reveals that he frequently skips his meals. You perform a upper GI endoscopy and it reveals duodenal ulcers. Other laboratory investigations reveal duodenal ulcer. Prescribe suitable drug(s) for this patient.

25. A 36 year old patient presented to the clinic with the complaints of burning epigastric pain which is relieved by food and he is diagnosed to have peptic ulcer. He is prescribed antacid gel and suspension sucralfate 1 gm qid for 2 weeks. Comment, correct and rewrite the given prescription.
26. Mr. Babu (35 years old) had epigastic pain. After examination and investigation he was diagnosed to have peptic ulcer and was prescribed the following:
   a. Cap Omeprazole 200 mg OD after food
   b. Tab. Aluminium Hydroxide 250 mg + Magnesium trisilicate 500 mg TID after food
   c. Tab. Sucralfate 1g TID after food
   d. Tab Ibuprofen 400 mg TID before food
   All drugs were prescribed for a period of 4 weeks. Comment, correct and rewrite the above prescription.

27. A 20 year old girl Ms. Kala experiences vomiting whenever she travels to a hilly area. Prescribe suitable drug(s) for this patient who is to embark on a picnic trip by bus to a hilly area.

28. A two year old child with non specific diarrhea, moderate dehydration and vomiting was prescribed the following:
   - Tab Loperamide tid
   - ORS powder
   - Inj Vit B Complex
   - Syrup Erythromycin 200 mg tid
   Comment, criticize and rewrite the above prescription if necessary.

**Respiratory System**

29. Prescribe for a 12 year old girl Miss. Rani with h/o dyspnea and wheeze for atleast 2 times during the night in a month. On examination her PEF was > 80 %. She was diagnosed to have mild persistent asthma. Prescribe suitable drugs for this patient.

30. Mr. Kannan 45 years with history of severe persistent asthma, was brought to casualty with severe dyspnoea and wheezing. He was on inhalation beclomethasone (80 micrograms) and salbutamol MDI (100 micrograms) QID on a chronic basis. His FEV$_1$ was 25%, HR – 130 beats per minute, RR- 30/min, BP-130/90 mmHg. ABG showed, pH- 7.4. PaO$_2$ – 55 mmHg, PaCO$_2$ – 40 mmHg. Serum sodium 140 meq/L, potassium – 4.1 meq/L and Chloride – 105 meq/L. He was given terbutaline 0.5 mg sc and O$_2$ given at 4 L/min by nasal cannula. Since the improvement shown was minimal he was given another injection of terbutaline 0.5 mg sc. Subsequently his heart rate increased to 145 beats/min. He also complained of palpitations and tremors.
   a. What is the cause of palpitations and tremors? How could it have been prevented?
   b. What is the cause of failure of initial therapy with terbutaline?
   c. Should corticosteroids be added to his therapy? If so how should it be started?

31. Mr. Kalim, 50 years of age with mild persistent asthma since childhood has been on several drug regimens for asthma over the years. He now comes to you and asks for a simplest regimen possible which can be taken orally. What will you prescribe for him?

**Central Nervous System**

32. A 30 year old male patient presented to your clinic with the complaints of insomnia for 2 days. Detailed history reveals that he has tooth ache for the past 2 days. Prescribe suitable drug(s) for this patient.

33. Mrs Asha, a 61 year old woman is brought to the casualty by her son after having an accident while climbing down the stairs. She appears drowsy, mildly confused and complains of pain at the hip and difficulty in walking. A radiologic examination reveals a fracture neck of femur. The patient has been taking tab diazepam 10 mg bd for her anxiety, tab ranitidine 20 mg bd for heart burn.
What could be the likely causes for this person’s present condition?
How could it have been circumvented?
What are the factors that influence the pharmacokinetics of benzodiazepines?
What is withdrawal reaction? Which of the sedative hypnotics do not have the withdrawal reaction as a side effect?

34. Mr Kalaiselvan a 25 year old man, a truck driver by profession is diagnosed with generalised anxiety disorder and is prescribed tab alprazolam 0.5 mg hs. After one month the patient comes back to you with no improvement in his condition and also complains of difficulty in his work.
   a. Why was there no response to drug therapy?
   b. What will you prescribe for this patient? Justify your answer

35. A 20 year old lady Ms. Kala, experiences seizures characterized by sudden loss of consciousness and then rigidity of the body for a few minutes. This is followed by jerking of the body musculature that lasts for 3 – 5 minutes followed by a state of flaccidity. Immediately after the seizure, she recovers consciousness but remains in a confused state. Prescribe suitable drug(s) for this patient.

36. Rishi is an 8 year old boy who has been diagnosed with absence seizures. He is started on Tab Carbamazepine 100 mg TDS and Tab Valproate sodium 200 mg TDS. Comment, correct and rewrite the prescription if necessary.

37. A 35 year old patient Mr. Murugan was diagnosed to have epilepsy two months back. He was started on tab. phenytoin 100 mg tds (Brand name – Dilantin) by a neurologist. Eventhough Mr. Murugan took the drug correctly for two months, he still had frequent attacks of epilepsy. He was dissatisfied with the neurologist and he went to consult a general physician. The general physician increased the dose and prescribed him tab.phenytoin 150 mg tds (Brand name-Epsolin). After one week of treatment he experienced nystagmus, diplopia, ataxia and sedation. Now he has come to your clinic to consult you and you order for plasma phenytoin levels and it is found to be 43.8 µg/ml. [Normal levels of phenytoin: 10-20µg/ml; Toxic levels: >20 µg/ml].
   Why this patient developed toxic effects of phenytoin? What should be done to prevent this?

38. Mrs Jayshree a 33 year old lady who was on tab haloperidol 5 mg for schizophrenia is brought back by her husband to the psychiatrist after 5 days of commencing treatment, stating that she is constantly restless and is unable to sit or stand still. She also does not sleep well. The patient is prescribed the following
   Tab Alprazolam 0.5 mg hs X 10 days.
   Tab Haloperidol 2 mg tds.x 10 days
   Was the management of the above case appropriate? Justify your answer.

39. Mr. Kumar, a 50 year old patient, on tab. haloperidol 10 mg tds developed rigidity and bradykinesia. He was diagnosed to have haloperidol induced parkinsonism. He was started on tab. levodopa (100mg) + carbidopa (25mg) tds. There was no improvement in the symptoms of parkinsonism. Comment, correct (if necessary) & rewrite the prescription.

40. Mr Banerjee, is a patient 58 years of age who has undergone a subtotal gastrectomy for carcinoma stomach. He is a known case of ischemic heart disease on regular treatment for two years. In the post operative period he has been given the following medication on day 1.
   a. Inj Morphine 5 mg SC q6h
   b. Inj Pentazocine 30 mg IM q6h
   c. Inj Ketorolac 30 mg IM q6h
   d. Inj Lorazepam 4 mg IV q12h
   Comment on the above prescription assuming that the doses are appropriate.
41. Mrs Meena, fifty years of age who underwent hysterectomy was prescribed the following for insomnia due to post operative pain.
   Inj Pethidine 2 mg s.c. sos
   Inj Diazepam 10 mg hs after first dose

   Half an hour after the injections she became very agitated and restless. Comment on the situation above, correct and rewrite the above prescription if necessary.

**Endocrinology**

42. A 40 year old woman Mrs. Sudha presented with weakness, fatigue, cold intolerance, constipation, dry skin and menorrhagia. Laboratory investigations revealed high levels of TSH and low levels of T3 and T4. Prescribe suitable drugs(s) for this patient.

43. A 34 year old pregnant lady Mrs. Kala presented to your clinic with the complaints of anxiety, loose stools, loss of weight inspite of increased appetite and heat intolerance. Clinical examination revealed warm and moist skin, tachycardia and tremor. Laboratory investigation revealed low levels of TSH and increased levels of free T3 and T4. Prescribe suitable drugs(s) for this patient.

44. A 55 year old woman Mrs. Devi came to your clinic with the complaints of backache, dull aching in nature for the past two months. Personal history revealed that she attained menopause two years back. Radiological examination of lumbar spine revealed areas of demineralization. You diagnose her to have postmenopausal osteoporosis. Prescribe suitable drug(s) for her.

45. A 32 year old female was on low dose combined oral contraceptive pills. She developed a lower respiratory tract infection and was prescribed cap. ampicillin 500 mg tds for 7 days. One month later she again presented to your clinic with complaints of missed periods. She was found to be pregnant. Comment, correct (if necessary – the second prescription without altering the first) and rewrite the prescription.

46. Mr Ranjith, 67 year old man, a known case of diabetes with hypertension for the last 10 years was on the following drugs.
   Tab Glimepride 1 mg od
   Tab Metformin 500 mg tds
   Tab Hydrochlorothiazide 25 mg bd
   Tab Aspirin 150 mg od

   The patient is brought to the casualty by his relatives with complaints of malaise, lethargy, loss of appetite, pruritus. Examination reveals hypertension with a blood pressure of 150/90 mmHg, cardiomegaly, rales and pleural effusion. Laboratory investigations revealed blood urea - 70 mg%, serum creatinine -3.2 mg/dl, Na⁺ - 127 mEq/dl, K⁺ – 5.9 mEq/l. Random blood glucose –158mg/dl. A diagnosis of chronic renal failure is made. Comment on the above prescription.
   What important complication (drug related) is the patient at risk now?

47. Write a suitable prescription for a 48 year old male patient who has been diagnosed to have type 2 diabetes mellitus. (fasting blood sugar- 136 mg%).
48. Mr. Dinesh a 32 year old male who is suffering from diabetes insipidus which was not improving with nasal administration of Desmopressin 20µ twice daily, was prescribed the following:

- Inj Plain Insulin 40 U im od
- Tab Chlorpropamide 10 mg bd
- Tab Hydrochlorothiazide 100 mg od
- Tab Calcium 300 mg od

Comment, correct and rewrite the above prescription.

49. A 25 year old male patient presents to the medicine OPD with a history of increased thirst, increased frequency of urination and unexplained loss of weight. His random blood sugar was 280 mg %. He was diagnosed to have Type 1 DM. Prescribe suitable drug(s) for this patient.

50. The list of essential medicines in a primary health center for disorders related to thyroid hormone are as follows:
   - Lugol’s iodine solution
   - Liothyronine Sodium(T3 Preparation)
   - Radioactive iodine solution
   - Tab. Glibenclamide
   - Tab. Tolbutamide
   - 50% dextrose solution

List 2 drugs which are not listed but should be included. Give reasons.
List 2 drugs which can be deleted from the above list. Give reasons.

Chemotherapy

51. Mr. Mohan a 16 year old boy had cough and fever for 2 days. On examination the pharynx was congested and throat swab on staining revealed gram positive cocci. Prescribe suitable drug(s) for him.

52. Prescribe for a 10 yr old boy with acute tonsillitis.

53. Prescribe for a 18 year old adult male who is suffering from acute tonsillitis. The patient is allergic to penicillin

54. Dr. Daniel has recently established his own clinic in a remote place near Villupuram. Mr. Natraj, 35 yrs old visited him with complaints of ear ache which developed previous night. On detailed history it was revealed that he was having cold for about 5 days. Dr. Daniel prescribed for 5 days the following drugs
   i. Cap. Amoxicillin 500mg tds
   ii. Tab. Paracetamol 500mg tds
   iii. Tab Diclofenac sodium 50mg bd

Comment on the principles of antimicrobial use practiced by Dr. Daniel.

55. Sundar, 40 yr old male was having fever and cough with expectoration for 5 days. He went to a local general practitioner who diagnosed it to be a case of severe lower respiratory tract infection. He was prescribed tab. paracetamol 500 mg tds for 5 days and cap. ampicillin 500 mg qid for 10 days. He came back to the general practitioner after 5 days with complaints of diarrhoea. He was subsequently prescribed tab. loperamide 2 mg BD for 3 days in addition to above prescribed drugs. Comment, correct and rewrite the prescription.
56. Fifty year old Mr. Sami with a prosthetic heart valve is to undergo tooth extraction and scaling. He gives a history of allergy to penicillin in the past. Prescribe for this patient regarding prophylaxis against bacterial endocarditis.

57. Twenty six year old Mrs. Kala presented with complaints of fever and burning sensation while passing urine. On examination she had right sided flank tenderness. Laboratory investigation showed WBC count to be 18,000 cells/ml, Urine culture showed gram –ve bacilli. A presumptive diagnosis of uncomplicated acute glomerulonephritis was made. Prescribe for this patient.

58. Mr. Sundaram, a well built patient suffering from gram – ve infection was prescribed injection amikacin 5 mg/kg tds after checking his creatinine clearance (120 ml/min). After 2 days his creatinine clearance became 40 ml/min. Assuming that no information is available regarding the plasma concentration of amikacin, comment, correct and write the prescription for this patient.

59. Prescribe for a 21 year old married female suffering from cholera.

60. Prescribe for a 30 year old pregnant female diagnosed to be suffering from chlamydial urethritis.

61. A 45 year old Mrs. Kannamma underwent elective vaginal hysterectomy and she was given normal therapeutic dose of cefazolin through iv during induction of anesthesia and the drug was continued till she was discharged from the hospital. Comment, correct and rewrite the prescription for prophylaxis if needed.

62. A 30 year old Mr. Muthu complains of lower abdominal pain, flatulence and occasional diarrhea. Stool culture showed E. histolytica and he was diagnosed to have mild intestinal amoebiasis. Prescribe suitable drug(s) for this patient.

63. A ten year old girl Selvi presented to your clinic with the complaints of generalised itching for the past 10 days. Physical examination shows generalised excoriations with small pruritic vesicles all over the body especially in the finger webs. She was diagnosed to have scabies. Prescribe suitable drug(s) for this patient.

64. A 38 year old patient Mr. Selvam presented to your clinic with the complaints of periodic attacks of sequential chills, fever and sweating for the past three days. Peripheral blood smear examination reveals P. vivax parasites. Prescribe suitable drug(s) for this patient.

65. Prescribe for a traveller who is planning to visit an area endemic for Plasmodium falciparum infection.

66. Mr. Rajan, 26 year old presented with the complaints of gradual onset of malaise, headache and fever for the past one week. Detailed history revealed that fever raised slowly to the maximum. Physical examination showed a temperature of 40°C, pulse rate of 76/min. Laboratory investigations revealed leucopenia and positive Widal test. Prescribe suitable drug(s) for this patient.

67. A thirty year old female presented to your clinic with the complaints of episodic fever for the past two weeks. Detailed history revealed that the fever occurs at irregular intervals and is associated with tender and inflamed lymph nodes. The patient resides in an area endemic to filariasis. Laboratory investigation shows microfilaria in blood. Prescribe suitable drug(s) for this patient.
68. Thirty five year old Mr. Ravi presented with the complaints of cough with expectoration for the past one month. Detailed history reveals that he has loss of appetite and weight. He also has evening rise of temperature. Sputum examination reveals acid fast bacilli. Chest radiograph shows apical pulmonary infiltrates. Prescribe suitable drug(s) for this patient.

69. A forty five year old male Mr. Krishna presented with the complaints of multiple pale patches in the skin. Physical examination revealed the skin lesion to be pale, anesthetic and macular. There was also superficial nerve thickening. Laboratory examination revealed acid fast bacilli in skin lesions. Prescribe suitable drug(s) for this patient.

**Emergency Pharmacotherapy**

70. A 28 year old type 1 diabetic Mr. Ramu presented to the emergency department with the complaints of marked fatigue, nausea & vomiting and mental confusion. Detailed history reveals that he is a diabetic for the past ten years and he is irregular in taking insulin injections. Physical examination shows dehydration, rapid deep breathing and a fruity breath odour. Laboratory investigations show blood glucose - 480mg/dl, urine ketones - strongly positive. Prescribe suitable drug(s) for this patient.

71. A 36 year old known epileptic patient Mr. Kannan, was brought to the emergency department for repeated seizures without recovery or regaining consciousness for the past 20 minutes. Detailed history reveals that he is very irregular in taking antiepileptic medications. Prescribe suitable drug(s) for him.

72. A 40 year old known asthmatic Mr. Kumar presented to the emergency department with difficulty in breathing. Physical examination revealed pallor and slight cyanosis. He was diagnosed with status asthmaticus. Prescribe suitable drug(s) for the treatment of this condition.

73. Mr Dwarak is a 55 year old patient who presents to the casualty with acute chest pain for the past 3 hours not responding to nitrates. He is a non smoker, non diabetic. The patient has hypertension for the last three years and is on treatment with Tab Atenolol 50 mg OD. ECG shows ST elevation in lead II, III and aVF. What treatment will you give him now?

**Miscellaneous**

74. A new oral contraceptive drug has been introduced in Africa. A single dose of the drug protects the user for six months. The drug has not yet been approved by any other country, through new drug applications have been filed in USA, UK and other countries. A researcher in a prestigious medical school from USA wants Dr. Malhotra, a renowned gynecologist to conduct clinical trials in India. He agrees and is sent for training to USA, returns to India with samples of the drug and conducts the trial in three primary health centres.
   a. Was Dr. Malhotra wrong to conduct the trials?
   b. Has any ethical principle been violated? (explain)
   c. How can Dr. Malhotra protect himself?
   d. Discuss implications of trying out new drugs on patients as a part of clinical testing

75. A novel surgical procedure for retinitis pigmentosa was published in a leading journal of ophthalmology. Out of the six patients who underwent the procedure three retained good vision, one partial vision and two did not improve. A famous eye hospital in India sent two of its staff to learn the procedure from the surgeon who did the surgery. On their return these two surgeons operated on 30 inmates from four orphanages for the blind. The hospital gave a wide publicity to this by advertising in the newspapers, television, etc. The hospital currently charges one and a half lakhs per patient for the procedure.
76. Ms Razia is a 23 yr old woman complaining of lower abdominal pain, dyspareunia, excessive discharge per vaginum for the past 4 days. There is history of sexual promiscuity in the recent past. A diagnosis of pelvic inflammatory disease is made. The patient is started on Cap Amoxicillin 250 mg bd and Tab Nalidixic acid 100 mg qid for 10 days. Comment, correct and rewrite the prescription if necessary.

77. Mr Jacob is a 65 year old diabetic with hypertension who is treated for acute anterior wall myocardial infarction in your hospital. He is now fit for discharge after 6 days of therapy. What will you prescribe for him at discharge?

78. A 28 year old type 1 diabetic Mr.Kirsten presented to the emergency department with the complaints of marked fatigue, nausea & vomiting and mental confusion. Detailed history reveals that he is a diabetic for the past ten years and he is irregular in taking insulin injections. Physical examination shows dehydration, rapid deep breathing and a fruity breath odour. Laboratory investigations show blood glucose - 580mg/dl, urine ketones - strongly positive. The patient is started on the following therapy.
   i. Inj. Regular Insulin 5 units sc stat.
   ii. Tab Metformin 500 mg tds
   iii. Inj. Dexamethasone 8 mg iv stat.
   iv. Inj. Ceftriaxone 2 mg iv bd
   v. 5% Dextrose 2 pints. iv infusion over 4 hours.
   
   a. Critically evaluate the above prescription
   b. How will you treat this patient?

79. Ms.Sharatha, 50 years of age, is a known case of hyperthyroidism on tab methimazole for the past 1 month. She now develops fever, rigors and sore throat. The physician Dr Prema prescribes her tab paracetamol 500 mg tds for 4 days, tab cetirizine 10 mg hs. She also asks her to do regular throat gargling and reassures her that it is just a viral infection. (a) Do you consider Dr Prema’s management appropriate? Explain with reasons. (b)How would you treat her?

80. Mr Ranga, 40 years of age presents to the emergency having sustained a snake bite this morning at 3 AM. He presents to the casualty now (7 AM) with pain and swelling at the site of the bite. The patient has a clotting time of 23 minutes.
   a. Does this patient require hospitalization? Give reasons.
   b. How will you manage a case of viper envenomation?

81. Dr Bhansal is a renowned cardiologist in a hospital in Delhi. He is approached by a leading pharmaceutical company to carry out a double blind placebo controlled clinical trial on a new antihypertensive drug in 300 patients with a diagnosis of malignant hypertension within the next 12 months. Since preclinical animal studies have shown benefits, Dr Bhansal has agreed to conduct the trial in his hospital. Is Dr Bhansal ethically justified to enroll patients? Give reasons.

82. Comment whether the following drugs are rational for the given clinical scenario.
   (a) Tab phenobarbital 30 mg bd for a child with absence seizures.
   (b) Tab amitriptyline 75 mg hs for a 48 year old patient with diabetic neuropathy.
   (c) Tab furosemide 20 mg od for a 50 year old patient with CHF and severe renal dysfunction [creatinine clearance 30 ml/min]
83. Dr Feroz is a neurologist, working in a government hospital who is approached by a pharmaceutical company to carry out a phase 2 study in hemorrhagic stroke patients with a new drug ‘FXE 23421’. He is expected to enroll 150 patients in one year. Dr Feroz agrees and enrolls all patients admitted to the casualty with a diagnosis of stroke after making the attenders to sign the informed consent document and completes the trial within a year. What ethical principle might have been violated?

84. Mr Harris, 60 years of age is a known case of diabetes on treatment with metformin 850 mg tds and glibenclamide 5 mg bd. He presents to the casualty with signs of severe congestive heart failure and high blood sugars (blood glucose 240 mg/dl). The patient is given the following drugs.

- Inj Morphine 5 mg iv stat
- Inj Furosemide 40 mg iv q8h
- Inj Mannitol 100 ml iv q8h
- Tab Metformin 850 mg tds
- Tab pioglitazone 30 mg od

Comment on the choice of each of the above drugs for this patient.

85. An adult patient was treated with tab metronidazole 800 mg three times daily for 7 days for hepatic amebiasis. During the course of treatment the patient consumed alcohol and a serious drug reaction occurred. Write the mechanism of the adverse drug reaction and suggest the further treatment of this patient.

86. Mr Jerome is a 50 year old smoker with ischaemic heart disease and hypertension who is currently on tab aspirin 150 mg od, tab enalapril 5 mg od, tab metoprolol 50 mg bd, and tab isosorbide dinitrate 10 mg tds for the last two months. He has been experiencing severe fatigue ever since and hence stopped taking all these drugs. (a) Why did the patient develop severe fatigue? (b) What is the complication that the patient is at risk now? (c) What important instructions will you give a patient who is taking these drugs?