

MANUAL
FOR
INTERNS ORIENTATION
PROGRAMME
ON
QUALITY CARE



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P R E F A C E

It is the privilege of NTTC to bring out this manual in a handy pocket-book format. This manual has a fairly long history since the late 80's when it was brought out by the department of Pharmacology covering various aspects of essential drugs and rational drug therapy.

Over the years, other disciplines joined in orientating interns on rational therapy. Since 1993, the whole programme was re-designed and focussed on quality care concept. This included orientation to communication skills (oral and written), rational use of diagnostic tests and therapies, essential and personal drug concepts and critical appraisal of medical promotion. These are not the only components of quality care though they are the most important.

The reduction in size has been made to create a "handy carry-around manual". The faculty of the IOP will be satisfied if the interns make the best use of this manual.

The support and encouragement given by the Director, the Dean, the Medical Superintendent and all the Heads of Departments of JIPMER are gratefully acknowledged.

Suggestions from all quarters on how to improve this manual is welcome.

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1. ETHICS IN MEDICINE



The edifice of Medicine stands on three pillars - Knowledge, Practice and Ethics. The propriety and moral rightness of all the acts of a medical professional, be it a matter of statistics, public health or individual care, constitute medical ethics. Ethics deal with professional values, Morals deal with personal values and the Law deals with societal values and mores.

One aspect of medical ethics is bedside

manners and professional courtesy. Another aspect deals with legal issues related to newer developments in medicine like euthanasia, MTP, in-vitro fertilisation, etc. Yet another area is social justice and equality in health care in the current milieu of free market forces. The important areas can be classified as follows:

1. Death and dying
2. Doctor-patient relationship
3. Patient's rights
4. Informed consent
5. Professional conduct
6. Confidentiality
7. Birth control and MTP
8. Assisted reproduction
9. Organ transplantation
10. Gift and sponsorship

Though the issues may seem widely spread out and covering different areas, the fundamental principles of Medical Ethics are only three:

1. Beneficence and Non-Maleficence

(Do good or at least do no harm - "primum non nocere")

2. Justice and Equality

(Consider all human beings equal in providing care, regardless of socio-economic, literacy level, religion and other factors)

3. Patient Autonomy or Freedom of Choice

(Patient should be free to choose the type of health care - Physician should be a guide, not a parent). Paternalism is the anti-thesis of this.

All the ethical issues could be reduced to one or more of these three principles. At times, two or more principles may operate and result in ethical dilemma. Group decision making helps in resolving the dilemma and in reducing personal bias.

PRECAUTIONS AGAINST MEDICAL NEGLIGENCE CLAIMS

Do's	Don'ts
<p>1. Develop a good doctor-patient relationship and maintain effective communication with the patient.</p> <p>2. Secure a full and informed consent for any invasive or operative procedure.</p> <p>3. Advise an X-ray examination whenever a patient present with a real or suspected bone or joint injury.</p> <p>4. Exercise care in selection of your assistants and delegation of duties to them.</p> <p>5. Cover your risk by adequate insurance for medical negligence claims</p>	<p>1. Do not promise a cure or 100% safety</p> <p>2. Do not base an important diagnosis on a clinical impression alone, if reliable diagnostic aids are available. However, use these aids judiciously.</p> <p>3. Do not, in the absence of an emergency, perform any additional operative procedure not expressly authorized..</p> <p>4. Do not do elective pelvic surgery during child bearing age unless it is definitely established that the patient is not pregnant.</p> <p>5. Do not leave your patient unattended during labour</p> <p>6. Do not fail to advise immunization where indicated</p> <p>7. Do not criticize another doctor.</p>



2. DOCTOR-PATIENT COMMUNICATION

(A) ORAL COMMUNICATION

Introduction

A common notion is that "*communication is the process of transferring thoughts and ideas from one person to another.*" This implies that communication is similar to pouring a liquid from A to B! Communication is not so simple or straight forward.

Communication is the process of sharing thoughts, ideas and feelings with each other in commonly understandable ways.

Communication is hardly ever 100% successful in the sharing process. An effective communicator anticipates and plans for such deficiencies.

Coding of Ideas and Thoughts

Code	Amount of meaning conveyed
Language (verbal, Written)	7%
Para-Language (tone, Pitch, accent, etc.)	38%
Non-verbal or Body-language (face and eye movements, other gestures, body space, dress and appearance, time, etc.)	55% (It explains how children are able to communicate so well despite poor literacy)

Attempted Persuasion

The factors influencing attempted persuasion by a doctor are: (1) Doctor's credibility, (2) Patient's felt need, (3) Other's opinion and (4) Evidence and Logic. If all the four elements are in mutual agreement, then persuasion is likely to succeed.

(i) PERSONALITY TYPES OF PATIENTS AND TACTICS IN HANDLING THEM

<i>Personality type</i>	<i>Tactics</i>
<p>Superior :</p> <p>Arrogant, snobbish; feels invulnerable and often denies that disease can harm; feels important about self.</p>	<ol style="list-style-type: none"> 1. Acknowledge patients worth in his/her own field of expertise. 2. Maintain adult to adult type of conversation and transaction. 3. Strongly affirm your own expertise especially when challenged or accosted by the patient. 4. Avoid 'Parent-Child' transactions.
<p>Dramatising / Hysterical:</p> <p>Dramatises symptoms; may deny or repress facts (or diseases); filtrations and seductive; has underlying insecurity and needs reassurance.</p>	<ol style="list-style-type: none"> 1. Be generous in reassurance, support and compliments. 2. But at the same time <i>discourage any emotional involvement.</i> 3. Allow patient to discuss his/her fears freely. 4. Help distinguish facts from fantasies. 5. Guard against any untoward response to filtrations or seductive appeal.
<p>Impulsive:</p> <p>Demands quick and easy solutions to problems; has low threshold for frustration; often appears childish in outlook and aggressive in behaviour.</p>	<ol style="list-style-type: none"> 1. Set firm limits - Do not permit undue expectations. 2. Hold the patient responsible for impulsive actions. 3. Avoid open confrontations as it may lead to unpleasantness and angry words. 4. Avoid humour, jokes, etc.

<i>Personality type</i>	<i>Tactics</i>
Silent, reclusive: Shy, aloof, reticent and detached.	a. Respect need for privacy. b. Be friendly and empathetic but do not expect him/her to respond - it is against their character to do so. c. Play 'nurturing-parent' role and see if it works.
Masochistic: Long-suffering by own admission; sees the present illness as one more episode of life-long occurrences of unpleasant events.	a. Do not avoid them - it aggravates sickness and suffering. b. Avoid reinforcing the sick-role! Use humour. c. Set limits of care and responsibility or they may end up dependent on you. d. Support and guide family members who must deal with masochism all the time. e. Maintain an adult to adult type transaction. 'Nurturing parent' role may worsen the illness related behaviour.
Suspicious: Paranoid about being harmed, exploited or taken for a ride; generally blames others for their illness and other problems.	a. Be friendly and open. b. Maintain an adult to adult relationship in all transactions. c. Avoid humour and cryptic comments. d. Inform all options fully. e. Acknowledge the need for circumspection and critical analysis. <i>But Be Firm in Your Rebuttal and Reputation</i> (based on facts).

<i>Personality type</i>	<i>Tactics</i>
<p>Dependent:</p> <p>Insatiable needs, overly dependent on their doctors to solve all their problems, tax their doctors to the point of creating genuine anger or frustration.</p>	<p>a. Show readiness and willingness to care for them.</p> <p>b. Interact in a direct and open way. Try to avoid `parent-child' transactions as it aggravates dependency.</p> <p>c. Set limits (time, availability, areas of health care, etc.)</p> <p>d. Avoid direct confrontation but turn responsibility for their behaviour back to them.</p> <p>e. Persuade them to be more autonomous and independent.</p>
<p>Orderly, Controlling:</p> <p>Overriding need for control of their problems by them-selves; see their body parts and bodily functions as `objects' to be under their control.</p>	<p>a. Inform methodically the nature of illness; treatment options, etc.</p> <p>b. Include the patient in decision making.</p> <p>c. Encourage patient's strengths to make them responsible for self-care.</p> <p>d. Make them feel they are in control of their illness or disability.</p> <p>e. Clearly inform of events or functions that cannot be controlled by volition.</p>

(ii) DO's AND DON'Ts DURING DOCTOR-PATIENT DYAD

1. Avoid cynical talk. "Cynic is one who knows the cost of everything but the value of nothing!"
2. Do not give misleadingly false hope; at the same time -
3. Do not give "hopeless" outlook - it may backfire at times or cause a "hex-death" situation.
4. Anticipate problems and be one step ahead - after all you know more than the patient about diseases!
5. Do not pass value judgement or create guilt complex.
6. Be aware of psycho-social pressures operating on the patient and his or her relatives.

(iii) CHARACTERISTICS OF A "GOOD" (CREDIBLE) CONSULTANT



1. Presence or Aura that promotes patient confidence.
2. Tolerance of patient's demands, expectations and idiosyncrasies.
3. Good communication habits like:
 - a) Initial greeting
 - b) Seating: conducive
 - c) Body posture: non-threatening
 - d) Eye-contact: neither too little nor too much
 - e) Interrupting only when indicated
 - f) Facilitating whenever needed
 - g) Keeping the talk relevant and 'on track'
 - h) Discussing personal and psycho-social issues of relevance
 - i) Use of silence at times
 - j) Expressed empathy
 - k) Take up verbal and non-verbal leads
 - l) Warmth and questioning style
 - m) Clarity of expression
 - n) End interview properly
4. Open in information exchange
5. Good educator of patients
6. Not mercenary in dealings
7. Respects other's time and interests

(B) WRITTEN COMMUNICATION
[Medical Records]

The importance of maintenance of medical records has been acknowledged from ancient times. The physicians of ancient Greece, Egypt and India have recorded in paintings and carvings the details of diseases and remedies prevalent in their civilizations. In present day practice, the significance of proper maintenance of records is well understood. The main purposes of these records are that:

1. It forms a means of communication between the physician and other members of the health care team.
2. It provides a basis for planning individual patient care.
3. It serves as a basis for evaluation of quality of patient care.
4. It assists in protecting the legal interests of the patient, hospital and physician.
5. It provides clinical data for medical education and research.

Good medical records generally reflect good medical care and vice versa. The skills of medical and allied health care professionals are required for comprehensive patient management. The team interact with each other through their entries in the record. It is essential that the medical record should contain necessary information to identify the patient, to establish the diagnosis and to give details of the treatment and progress of the patient. This holds good for both out-patient and in-patient records.

The *In-patient Record* begins with the admission of the patient. The Admission Record contains details of the patient's complaints, medical history, physical examination details and plan of treatment.

The *In-patient Case Sheet* contains the following:

1. Progress Notes
2. Doctor's Orders
3. Reports of Investigations
4. Consent Forms
5. Special Forms, e.g., Labour record, operation notes, cross reference forms
6. Discharge Summary

(i) HOW TO WRITE A PROGRESS



1. When you write a progress sheet, always think of what information can be gathered from your records by some other doctor. Imagine what information you can get after six months or one year from your records.

In writing a record you must be accurate, brief and clear.

2. Always mention the date and time of your progress report, and sign legibly underneath. This is important because in case of later enquiry or investigation, the identity of the treating doctor is to be established. This is especially true in medico-legal cases.

3. Irrespective of whatever notes you have written earlier in Casualty or out-patients, always start the progress report as if it were a new case.

4. When a patient gets admitted to the ward, write a brief note about the case. If it is a diagnostic problem, mention the prominent clinical findings and say what the problem is.

5. If it is a known case admitted for a therapeutic procedure, mention what therapeutic procedure you are going to perform and why you are doing it now.

6. In case of emergency admission, mention what the emergency is, what has been done till now and what you are going to do.

7. If you are planning an emergency operation, mention specifically the indication and justification for the operation.

8. In all cases, it is better to write a plan of investigations and management which can be suitably modified by your seniors.

9. If you have consulted a senior person, mention his name and designation and time of consultation.

10. On subsequent days, make a mention of whatever change has occurred in the patient's conditions. If there is no change, say so. Don't write, "G.C. Fair temperature N" ad nauseum. Parameters for daily monitoring have to be individualised, e.g., BP in a hypertensive and wheezes in an asthmatic.

11. If patient has undergone some investigations or operative procedure, mention this in your progress record. You must also indicate whether this has changed the diagnosis and general conditions of the patient.

12. When the patient gets discharge, you must mention his condition at the time of discharge and also your recommendations and when you want him to come back.

(ii) HOW TO WRITE DOCTOR'S ORDERS

The written medical orders constitute the physician's directions to the Nursing and other staff covering all medications and other treatment given to the patient.

1. All orders must be signed by the attending doctor.
2. When repeating the orders, each item should be repeated separately and no terms like "repeat all" should be used.
3. When starting a fresh sheet, all the orders should be repeated fully and not as repeat (1), (2), (3), etc.

(iii) HOW TO WRITE A CROSS REFERENCE FORM

Cross Reference Form is sent in order to get:

- (a) assistance in diagnosis or therapy
 - (b) a specific procedure
 - (c) a second opinion
-

1. Make sure that the identification and characteristics of the patient, viz., name, hospital number, age, ward and bed number are properly written.
2. Mention the referring unit and the unit to which the reference is being made.
3. Classify carefully whether the reference is of routine nature or of urgent nature. Do not make a reference urgent because the routine reference was forgotten.
4. Precisely and briefly mention the findings in the patient in the appropriate column.
5. Try to be as precise as possible in communicating what is your expectation from the referred unit. Do not be ambiguous.
6. Sign legibly and write your designation.
7. Remember you are referring to a Unit Head on behalf of your Unit Head.
8. Do not suggest any treatment. For example:
 1. Not "Please extract the tooth", but "Please attend to this patient's dental problem."
 2. Not "Do lymph node biopsy", but "For favour of tissue diagnosis".
9. Always mention the date and time of reference.

(iv) HOW TO WRITE A DISCHARGE SUMMARY

A Discharge Summary (or Clinical Resume) is required for:

- (a) Continuity of medical care to the patient on a subsequent re-admission, or for treatment at another hospital.
 - (b) To facilitate review by medical staff regarding patient care and for office records.
-

The Discharge Summary should be concise and written promptly after the patient's discharge. It should contain information about:

1. Why did the patient enter hospital? - chief complaint and history of present illness.
 2. What were the physical findings and laboratory findings?
 3. What was the medical and/or surgical treatment including patient's response, complications and consultations.
 4. What was the patient's condition on discharge?
 5. What instructions were given regarding continuing care and follow up? - medication, diet, physical activity and date of next appointment.
-

Discharge Summary, even if written by a resident staff, is best countersigned by the attending Physician. The summary carries the "image" of the unit and the hospital.

3. RATIONAL MANAGEMENT

(A) RATIONAL USE OF DIAGNOSTICS

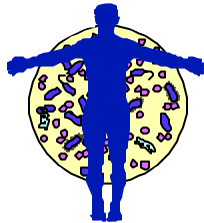


Using WHO definition of irrational drug therapy as the basis, irrational use of diagnostics may be defined thus: "a diagnostic test is irrationally used when the expected benefit is negligible or nil or when it is not worth the potential harm or the cost."

It is indeed strange that while so much has been written about irrational drug usage, not enough attention has been focused on irrational use of diagnostics. If one realises that an irrational CT-Scan is equivalent to about 100 bottles of an irrational 'tonic', then the importance of rational use of diagnostics will be apparent.

Due to the practice of 'defensive medicine', excessive use of diagnostics has become the norm rather than the exception. This has led to expensive, irrational and wasteful hi-tech medical practice. Unless curbed, individual and national economies may face hardships as is evident in USA in the 90's.

WHY INVESTIGATE - AN INTROSPECTION



Before requesting an investigation, the clinician should ask himself/herself the following queries:

1. Will the test result help me to -
 - a) confirm/establish diagnosis,
 - b) rule out a diagnosis,
 - c) monitor therapy,
 - d) estimate prognosis, or
 - e) screen for and detect a disease?

2. Can the abnormality I seek in this case -
 - a) exist without any clinical evidence of it?
 - b) even if present, be in any way harmful to the patient?
 - c) be treated or controlled? and
 - d) be worth the cost and the risk for this patient?
 - e) Is there no safer and more economical alternative?

If , after careful thought, the answer to all these questions is a clear `No', then there is no need to do the test. If the answer to any one of them is `Yes', the test may need to be performed depending on its availability, predictive values and patient's affordability.

COMMON PITFALLS (`Why Not Investigate' Syndrome)



A prudent clinician should be wary of the following statements which promote irrational use of investigations:

1. "It would be nice to know"
Ask yourself `nice for whom?' - will it really help the patient or is it merely to satisfy your academic curiosity?
2. "We would like to document it fully" -

Will this extra
documentation make any difference to the patient?

3. "Everyone else does it" - They all may be right, but are you aware of the reasons? Perhaps, they too do it because `every one does it! Medical practice is full of examples of transient fashions that do not stand the test of Time. Do not accept and adopt such `medical fashions' uncritically.

HOW OFTEN SHOULD I INVESTIGATE?

This depends on the following factors:

1. How quickly are measurable and significant changes likely to occur? For example, plasma protein does not change in less than a week unless infused.
2. Whether a change, even if numerically significant, will alter management? For example, serum transaminase levels change rapidly during acute hepatitis. But once the diagnosis is made, this change is unlikely to affect management.

WHEN IS AN INVESTIGATION `URGENT'

The only justification for urgency is when an earlier result will alter management. This situation is very rare.

WHAT TO DO WITH THE LABORATORY REPORT?

1. When it is consistent with the clinical situation, follow up the case with treatment.

2. When it is (a) unexpected or (b) incompatible, as in the examples given below, repeat the test to rule out a mix up. For example:

(a) Cervix apparently looks healthy but cytology report is positive for malignant cells.

(b) Previous cervical smear done two weeks ago was negative, But the present smear is positive for invasive carcinoma.

In any case, record the report with reference number and date in the case sheet and case summary with a note on the uncertainty.

HOW TO GET THE MAXIMUM OUT OF THE LABORATORY SERVICES ?

1. Order for the minimum number of tests warranted by the clinical situation.

2. Await the results of preliminary screening tests before ordering a complete list. For example:

- a. Check the reticulocyte count before ordering for a full work up on haemolytic anaemias.
- b. Check the peripheral smear report in cases of hepatosplenomegaly before ordering a bone marrow aspiration or a liver biopsy.

3. For special tests, make sure that the concerned department/section has been informed and kept ready. For example: Frozen section, Immuno-fluorescence study for renal or skin biopsy, Coagulation studies, etc.

**CHECK THE FOLLOWING BEFORE DESPATCHING
A LABORATORY REQUISITION**

1. Have you checked whether the test you are ordering now has not been done already? (Report may have been misplaced or may be on the way).
2. Have you used the correct form? Have you entered the patient ID correctly?
3. Have you specified the nature of test required?
4. Have you indicated the urgency (if needed)?
5. Have you provided the relevant clinical details/X-ray findings and cross reference (Example: Previous biopsy number, peripheral blood picture)?
6. Have you used the correct container, sample, anti-coagulant?
7. Does the ID label on the container match the patient ID?
8. Have you made a note in the case record after ordering?

**HOW TO GET REPORTS FROM THE LABORATORY
IN URGENT CASES ?**

1. Contact the section concerned on phone or appraise directly the officer concerned on the nature of emergency such as blood transfusion or frozen section.
2. Personally ensure the despatch of the correct sample and quantity in the recommended containers to the correct section of the laboratory. Confirm the receipt of the sample in the laboratory and find out when the report would be ready.

**FACTORS WHICH MAY CAUSE DELAY IN
PROCESSING URGENT REPORTS**

- a. Overload of work.
- b. Over-utilisation of the label 'urgent' leading to a disregard for the label - the "cry wolf syndrome".
- c. Frequent interruption of routine work.

**FACTORS RESPONSIBLE FOR NON-RECEIPT OF
LABORATORY REPORTS**

1. Wrong entry or non-entry of patient ID.
2. Sample is kept pending in the laboratory for want of:
 - a) Essential data like name, hospital number, ward.
 - b) mention on the nature of test ordered.
 - c) reagents not available in the laboratory.
 - d) batch processing of kit based tests.
3. The specimen reaching the wrong laboratory or not reaching there at all.

**OTHER REASONS FOR A DELAYED REPORT
FROM THE LABORATORY**

1. Lack of relevant details on the requisition which have a bearing on this investigation.

Example:
Cytohormonal study, histopathology of bone marrow and lymph node, histopathology of bone tumours, renal and dermatopathology.
2. Time consumed (few days) in doing certain special staining procedures and in decalcifying bone.

(B) RATIONAL DRUG THERAPY



REASONS FOR IRRATIONAL PRESCRIBING

1. Lack of training in clinical pharmacology and in basic principles underlying rational drug use.
2. Lack of continuing education, supervision and critical review of prescribing practices.
3. Promotional activities by pharmaceutical companies.
4. Desire for prestige.
5. Too many patients.
6. Uncertain diagnosis.
7. Reliance on their own limited favourable experience with a drug regardless of scientific merit.

TYPES OF IRRATIONAL PRESCRIBING

Irrational drug prescribing can occur when the medication prescribed is incorrect, inappropriate, excessive, unnecessary or inadequate (WHO Draft, 1985). Accordingly, the types of Irrational Prescribing are:

1. Incorrect prescribing
2. Inappropriate prescribing
3. Over prescribing
4. Multiple prescribing
5. Under prescribing

INCORRECT PRESCRIBING



It can result when the wrong medication is prescribed for the patient, e.g., an erroneous diagnosis or inadequate knowledge of the drug.

It can also happen when clinical laboratories or other diagnostic facilities are limited or the patient's history is inadequate.

Ignorance of drug's actual therapeutic indications or the availability of alternatives that are clearly safer and/or more effective, e.g., selection of a newer non-steroid anti-inflammatory drug or a glucocorticoid rather than aspirin for the treatment of rheumatoid arthritis exposes the patient to more expensive medication and may lead to severe side effects.

INAPPROPRIATE PRESCRIBING

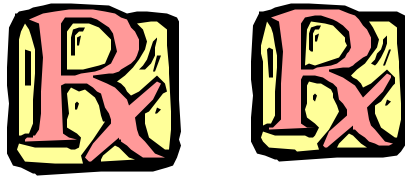
This results when:

1. The most appropriate medication is not selected, e.g., an expensive unusual or rarely stocked drug is prescribed in preference to a less expensive or readily available drug.
2. Prescribing a drug that cannot readily or safely be administered such as IV preparation of amphotericin B.

OVER-PRESCRIBING

Over prescribing includes prescription of a drug that is not needed. A drug given in excessive dose or for too long period of time often in an attempt to reduce the frequency of patient's visits.

MULTIPLE PRESCRIB-



It is the use of:

1. An unnecessary number of drugs when fewer drugs will produce an equivalent beneficial effect, e.g., prescribing two or more drugs or a multi-drug combination products when only one or two drugs are needed.
2. A drug to counteract adverse effects produced by the primary drug when selection of an alternative primary drug can reduce or eliminate such side effects, e.g., ampicillin produces diarrhoea for which anti-diarrhoeals are used.

UNDER-PRESCRIBING

1. Giving inadequate amounts of medication or failure to prescribe a needed drug, e.g., withholding medications like morphine in terminally ill patients because of an unreasonable fear of producing opioid dependence.
2. Prescribing inadequate drug dosage or using medication for an insufficient period of time to treat the patient, e.g., sub-therapeutic doses of antibiotics promote the development of bacterial resistance.

Under prescribing is often employed in an attempt to conserve medication for very sick patients or using lower doses to treat more people.

WHAT DO WE NEED TO KNOW FOR RATIONAL PRESCRIBING



1. Basic pharmacology of a drug.
2. Indications for this drug's use.
3. Contra-indications to this drug's use.
4. Side effects of this drug.
5. Drug interactions.
6. Cost to the patient and community.
7. Dosage schedule.
8. What is the quality of the evidence provided about the risk/ benefit ratio of this new drug compared to existing therapy?
9. What conclusions have independent experts reached about the role of this new drug (e.g., review articles, editorials, etc).



(C) P-DRUG CONCEPT

Introduction to P-drugs

P-drugs are 'Personal' drugs you have chosen to prescribe regularly, and with which you have

become familiar. They are your priority choice for given indications. The P-drug concept is more than just the name of a pharmacological substance, it also includes the dosage form, dosage schedule and duration of treatment. P-drugs will differ from country to country, and between doctors. As you use your Pdrugs regularly, you will get to know their effects and side effects thoroughly, with obvious benefits to the patient.

In general, the list of drugs registered for use in the country and the national list of essential drugs contain many more drugs than you are likely to use regularly. Most doctors use only 40-60 drugs routinely. It is, therefore, useful to make your own selection from these lists, and to make this selection in a rational way. In fact, in doing so, you are preparing your own essential drugs list. You should compile your own list of P-drugs instead of just copying it from clinical teachers, or from existing national or local treatment guidelines or formularies.

WHY SHOULD YOU COMPILE YOUR OWN LIST OF P-DRUGS?

1. You have final responsibility for your patient's well-being and you cannot pass this on to others. While you can and should draw on expert opinion and consensus guidelines, you should always think for yourself.
2. You will learn how to handle pharmacological concepts and data.
3. You will know the alternatives when your P-drug choice cannot be used.
4. You will regularly receive information on new drugs, new side effects, new indications, etc. However, the latest and the most expensive drug is not necessarily the best, the safest or the most cost-effective.

STEPS IN CHOOSING A P-DRUG

1. Define the diagnosis.
2. Specify the therapeutic objective.
3. Make an inventory of effective groups of drugs.
4. Choose an effective group according to criteria:
 - a) The pharmacological action of this group needs further comparison. During this process, three other criteria should be used: safety, suitability and cost of treatment.
 - b) Efficacy is not based on pharmaco-dynamics alone. The therapeutic objective is that the drug should work as soon as possible. Pharmacokinetics are therefore important as well.
 - c) Safety: All drug groups have side effects, most of which are a direct consequence of the working mechanism of the drug.
 - d) Suitability: This is usually linked to an individual patient and so not considered when you make your list of P-drugs. However, you need to keep some practical aspects in mind.
 - e) Cost of treatment: Prices differ between countries, and are more linked to individual drug products than to drug groups.
5. Choose a P-drug:
 - a) Choose an active substance and a dosage form.
 - b) Choose a standard dosage schedule.
 - c) Choose a standard duration of the treatment.

Summary

HOW TO SELECT A P-DRUG

1. Define the diagnosis (pathophysiology)
2. Specify the therapeutic objective
3. Make an inventory of effective groups
4. Choose a group according to criteria
Efficacy Safety Suitabilit C
Group 1
Group 2
Group 3
5. Choose a P-drug
Efficacy Safety Suitabiyy Cost
Drug 1
Drug 2
Drug 3

Conclusion:

Active substance, dosage form:

Standard dosage schedule :

Standard duration :

(D) CHOOSING DRUGS IN SPE-

Drugs with Possible Risk of Haemolysis In Some G6PD-deficient Subjects	
Dapsone and other sulphones	(higher doses for dermatitis herpetiformis more likely to cause problems)
Methylene blue	
Niridazole	
Nitrofurantoin	
Pamaquin	
Primaquine	(30 mg weekly for 8 weeks has been found to be without undue harmful effects in Afro and Asian people)
4-Quinolones (including ciprofloxacin and nalidixic acid)	
Sulphonamides (including co-trimoxazole; some sulphonamides, e.g., sulphadiazine, have been tested and found not to be haemolytic in many G6PD-deficient subjects)	
Drugs with Possible Risk of Haemolysis In Some G6PD-deficient Subjects	
Aspirin (acceptable in a dose of at least 1 g daily in most G6PD-deficient subjects)	
Chloroquine (acceptable in acute malaria)	
Menadione, water-soluble derivatives (e.g., menadiol sodium phosphate)	
Probenecid	
Quinidine (acceptable in acute malaria)	
Quinine (acceptable in acute malaria)	

DRUGS IN PREGNANCY OR LACTATION

FDA Categorisation 1979

- A - No foetal risk - human studies
- B - No foetal risk - animal studies
Risk in animal studies
Not in human studies
- C - No adequate studies
- D - Foetal risk and benefits outweigh risk
- E - Proven foetal risk outweighing benefits

General Rules for Drug Use in Pregnancy or Lactation

1. Avoid any drug as far as possible.
2. If needed, choose category A or B drugs.
3. If life saving, use the drug.
4. Drugs in general are excreted in small amounts in breast milk.

COMMON DRUGS

<u>Antimicrobials</u>	<u>Analgesics</u>	<u>Anti-hypertensives</u>
Penicillins (B)	Paracetamol (B)	Methyldopa (C)
Erythromycin (B)	Pethidine (B)	β Blockers (C)
Cephalosporin (B)	Morphine(B)	CA channel
Metronidazole (B)	Aspirin (C)	blockers (C)
Cotrimoxazole (C)	Codeine (C)	Hydrallazine (C)
Acyclovir (C)	Ibuprofen(D)	
Zidovodine (C)		
Quinolones (D)		

Anti-parasitic agents	Diuretics	Asthma
Mebendazole [C] Quinine [D] Chloroquine [C] Pyrimethamine [C] Spiramycin [A]	Furosemide [C] Thiazides [B]	Terbutaline [B] Theophylline [C] Cromolyn [B] Epinephrine [C]
Sedatives, Hypnotics, Tranquilisers	Anti-coagulant	Anti-convulsant
Diazepam [D] Phenothiazines [C]	Heparin [C]	Carbamazepine [C] Phenytoin [D] Valproic Acid [D] Phenobarbitone [D]

4. HOW TO DEAL WITH MEDICAL REPRESENTATIVES

1. See him only by appointment.
2. Be clear regarding the time you have available.
3. Take control at the beginning of the meeting.
4. Ask what products he is detailing and discuss only those that interest you.
5. Don't be afraid to interrupt.
6. Ask what is the role of his drug in relation to currently accepted therapy (e.g., peer-consensus guideline recommendations).
7. Specifically ask about contra-indications, adverse effects and costs (use MIMS, etc., as a check).
8. Request independent published evidence (review articles, editorials, etc).
9. Evaluate the evidence critically (see "CRAP Detection").
10. Take time to summarise the prescribing information you have learnt.
11. Decline the offer to evaluate the product on a few patients using sample packs or promotional research.
12. Before accepting hospitality, gifts and gimmicks remember there is no such thing as a free lunch in the business world, only the expectation that you will provide a favour in return. It is our patients who pay.
13. If you are in a teaching or group practice, request permission to record some interviews for subsequent group evaluation (after all drug reps record information about you).
14. Be familiar with the codes of conduct and if the promotion seems questionable refer it to the Medical Lobby for Appropriate Marketing (MaLAM).

CRAP DETECTION



Crap detection refers to applying your critical mental faculties to detect logical fallacies and other tricks used during medical promotion.

5. PRECAUTIONS



1. Such patients should be taken up last for operation, on the day of the operation.
2. If possible, he/she should be operated in isolated operating theatre, which can be

easily cleaned at the end of the operation without disturbing the routine operation of the next day.

3. Minimum necessary staff should remain in the operation theatre while the operation is being carried out.
4. Nobody should be allowed to move out of the operation theatre *till* the operation is over, and soiled linen and plastic covers, etc., are discarded inside the same operation theatre.
5. All the staff must wear gloves while handling such patients.
6. Special precautions for 'HIV' positive case is to wear plastic caps, water resistant aprons, leggings and goggles.
7. As far as possible, disposable equipments and instruments should be used.
8. All unnecessary equipments must be cleared from the operating room prior to use.
9. Operating table to be covered with a single sheet of polythene which is to be incinerated at the end of surgery •
10. Used disposable items must be burnt without washing.
11. All soiled linen must be dipped in Hydrochloride solution overnight and then packed in a plastic bag and sent to Laundry for autoclaving. Instruments should be dipped in Cidex followed by autoclaving before they are washed.



12. Blood specimens must be handled very carefully and must be packed and labelled 'Infection Risk'
13. Staff who have 'open wound' must not enter the operation theatre.
14. Staff working in the theatre must take all pre cautions to avoid open injury to themselves.
15. No touch technique to be employed as far as possible.
16. If blood of the patient comes in contact with the body of the staff, it should be gently rinsed with water immediately.
17. Use of scissors or diathermy to cut in preference to knife.
18. No hand-held needle to be used. All needles must be held in needle holders.
19. Sharp instruments should not be handed over from nurses to surgeons and vice versa, but must be kept in a bowl.
20. Patients should not be taken to post operative ward, but from OT directly to his/her bed.
21. Skin to be closed as far as possible by clips and not sutures.
22. All staff exposed to risk due to a breach in technique must be given AZT, if possible.
23. HIV infection is transmitted by blood and blood products; HIV infection can spread by direct entry of virus by infected needles. Contaminated articles, e.g., linen, should be placed directly into a puncture resistant disposable container and labelled 'Infection Risk'. pos-
24. There is no need for fumigation of OT for HIV and Hbs Ag cases. However, a thorough washing by soap is adequate.

POST EXPOSURE PROPHYLAXIS

Risk of HIV transmission in the health care setting is quite low and is estimated to be 0.3% for needle stick injury and 0.09% for mucous membrane exposure.

Risk for HIV transmission depends on (a) gravity of the accident (depth, inoculation of blood/body fluids, quality of needle-hollow bore/surgical, and (b) infection status of the source patient (viral load).

Transmission is likely to occur only on exposure to the following:

Blood, CSF, Peritoneal fluid, pericardial fluid, synovial fluid, amniotic fluid, saliva in association with dentistry, unfixed organ or tissues.

Vaginal secretions, semen.

What to do after exposure?

DO NOT PANIC

Wash the wound/site in contact with body fluids with soap and water.

Mucous membranes should be flushed with water.

Use of antiseptics or expressing fluid by squeezing is NOT recommended.

Chemotherapy for PEP reduces the risk of transmission by nearly 80% if started within 2 hours.

Consult medical specialists for counselling regarding PEP.

HIV infection is NOT transmitted by:

Blood falling on the skin, by coughing and sneezing, through sweat, tears or insect bites, by air or by living or working with patients suffering from HIV infection and through food, urine and faeces.

6. GUIDELINES FOR LABORATORY INVESTIGATIONS

(A) PATHOLOGY

COLLECTION OF SAMPLES FOR HAEMATOLOGICAL INVESTIGATIONS

Blood is obtained from two sources, viz., (1) Capillary blood, and 2) Venous blood. For routine haematological investigations, venous blood should be sent in anticoagulant bottles which can be obtained from the Haematology laboratory (EDTA bottles). For coagulation studies, 3.1% sodium citrate solution is used in the ratio of 9:1.

Precautions to be taken to avoid haemolysis

1. Make sure the syringe and needle are dry.
2. Avoid rough handling of blood at any stage.
3. Do not eject the blood from the syringe through the needle. Remove the needle first.
4. Avoid frothing.
5. Mix with anticoagulant by gentle inversion and not by shaking

Peripheral smear should be made directly from the capillary blood obtained by finger prick or from the venous blood before adding anticoagulant.

For best results, samples should be sealed and sent to the Hematology laboratory without any delay. If there is delay beyond 1 to 3 hours, do not allow the sample to stand at room temperature; store the sample at 4-10°C. Do not freeze the blood, because the red cells will hemolyse on thawing.

COLLECTION OF SAMPLES FOR CYTOLOGICAL EXAMINATION

Fluids:

Fluids should be sent fresh. If delay is unavoidable, refrigeration of the sample is recommended. If the fluid sent for Cytology is likely to clot, anticoagulation is recommended with 1 ml of 3.8% sodium citrate per 10 ml of the fluid or EDTA 1 mg per 1 ml of fluid.

Urine:

A freshly voided early morning sample is ideal. If delay is unavoidable, then add an equal volume of 50% ethanol as a fixative.

Aspiration Cytology:

Material aspirated by a fine needle for cytology can be spread on two slides similar to spreading of marrow preparation, one for immediate wet fixation in 95% ethanol and the other air dried for May Grunwald Geimsa Stain.

<i>Investigation</i>	<i>Procedure</i>	<i>Advance intimation/ preparation</i>
1. Histological report	Biopsy tissue or organ to be immediately fixed in 10% formalin at least 5 times the volume of the specimen	Not necessary
2. Frozen Section report (available during working hours only)	Biopsy tissue or organ to be immediately sent to Histopathology section	Prior intimation on the previous day afternoon
CYTOPATHOLOGY		
1. Screening of cervical smears for malignance 2. Vaginal smears for hormonal evaluation	Wet smears to be fixed immediately before drying in ether alcohol (1:1) fixative supplied in coplin jar from the cytology division of Histopathology lab.	Not necessary
3. Buccal smear for Nuclear chromatin body	Patient to be sent to the cytology laboratory	
4. Aspirate from breast or solid organ 5. Amniotic fluid cytology for foetal maturity 6. Sputum for malignancy 7. Fluids and aspirates like gastric ascitic pleural, CSF, urine etc.	Samples to be sent to Cytology section as soon as possible for staining	Not necessary

<i>Investigation</i>	<i>Procedure</i>	Advance Intimation / Preparation
HAEMATOLOGY NB: 1. Blood should be sent to the lab. within on hour of collection. 2. Ambulatory patients may be sent to the lab. with the requisition.		
1. Complete Haemogram (Tests included are Hb, RBC, TC, DC, ESR, PCV and Calculation of indices) 2. Platelet count	2 cc. of blood of EDTA bottle to be sent to the lab. along with the requisition	Not necessary
3. Reticulocyte count 4. Absolute eosinophil count	EDTA blood to be sent to the lab.	
5. Bleeding time 6. Clotting time	Patient to be sent to the Laboratory	
7. LE. cell	5 cc clotted blood	
8. Coagulation studies: a Prothrombin time b Kakolin partial thromboplastic time c Thromboplastin generation test. d Tests for Factor II, V, VII, X. e Prothrombin consumption time f Euglobulin lysis test g Paracoagulation test h Clot refraction test i Platelet aggregation test j Platelet factor III test	Request to be sent to the Lab. Technician to collect the blood samples either in the lab. (ambulatory patients) or from the ward.	Prior date to be fixed

<i>Investigation</i>	<i>Procedure</i>	<i>Advance Intimation / preparation</i>
9. Alkali Denaturation test	4 cc EDTA blood to be sent	Not necessary
10. Sickling test 11. Tests for G6PD	Patient to be sent to the laboratory	Not necessary
12. Osmotic fragility test	2 cc EDTA blood to be sent	
13. Incubation fragility test 14. Autohemolysis 15. Heat stability test for unstable haemoglobin	Patient to be sent to the laboratory	Prior intimation
16. Haemoglobin electrophoresis	4 cc EDTA blood	Not necessary
17. Ham's test	8 cc EDTA blood	Prior intimation
18. Cytochemistry for leukaemias	Requisition to be sent	Not necessary
19. Bone marrow smears	Requisition to be sent	Date and time to be fixed
BLOOD BANK		
1. Blood grouping 2. Grouping and cross matching 3. Antiglobulin test 4. Rh Antibody titre 5. Testing for Hbs Ag (only for screening blood donors)	2 cc clotted blood to be sent	Not necessary

<i>Investigation</i>	<i>Procedure</i>	Advance Intimation / preparation
OPD LABORATORY		
1. Total WBC count 2. Haemoglobin 3. Differential WBC Count 4. ESR 5. Bleeding time and clotting time 6. Impression on the peripheral blood smear	Patient to be sent to OPD Lab. And blood will be collected by Technicians	Not necessary
7. Urine : Routine - albumin, sugar and microscopy	Patient to be sent to the laboratory for urine collection	
8. Semen analysis	Date is fixed by the Technician when the patient reports to him	Date to be fixed
9. Stool—Microscopy	Samples are brought by the patient	Not necessary

(B) MICROBIOL-

TIME SCHEDULE FOR RECEIVING SPECIMENS FOR INVESTIGATIONS

Working hours:

9.00 am to 4.30 pm (with lunch break 1.00 to 2.00 pm)

On working days:

Outdoor specimen reception at the Central Laboratory - 9.00 am to 12 noon.

Indoor specimen reception for culture and sensitivity at Microbiology Department - 9.00 am to 10.30 am.

Emergency samples:

Round the clock on all days of the week for notified investigations only (like stool sample for cholera throat swab for diphtheria, CSF for acute pyogenic meningitis, tissue/aspirate for gas gangrene, etc.). Resident doctors are available on duty who can be called if the laboratory is closed.

- Note:**
1. Consult the Department in cases of any problem in collection, transportation and process of specimen and interpretation of results.
 2. Specimen should be accompanied by an appropriate requisition form duly filled in all respects.

**LIST OF INVESTIGATIONS CARRIED OUT
IN THE DEPARTMENT OF MICROBIOLOGY**

Bacteriology Section

1. Urine culture - semi-quantitative method.
2. Culture of exudates: CSF, pleural fluid, sputum, pus, etc.
3. Stool culture for common enteric pathogens like Salmonella, Shigella and Vibrio.
4. Blood culture - enteric and non-enteric.
5. Antibiotic susceptibility testing for all clinical isolates of micro-organisms.
6. Anaerobic culture for sporing and non-sporing micro-organisms, e.g., Clostridia, Bacteroides, etc.
7. Sterility checking of intravenous fluids.
8. Bacteriological testing of water.
9. Culture of hospital specimens from environment and others for monitoring nosocomial infections.

Serology Section

1. VDRL - qualitative and quantitative for serum and CSF samples.
2. Widal test.
3. Brucella agglutination test.
5. Paul Bunnell test.
6. Rheumatoid arthritis - Latex agglutination test.
7. Antistreptolysin 'O' test.

Mycobacteria Section

Culture for AFB from all specimens.

Parasitology Section

1. Examination of faecal and non-faecal specimens for direct demonstration of the parasites or their constituents.
2. Culture of *E.histolytica* from faecal & non-faecal specimens.
3. Skin tests - Casoni's test, filarial skin test.
4. Indirect haemagglutination test for amoebiasis, hydatid disease and filariasis.
5. Examination for malarial parasites, microfilaria and L.D. bodies.
6. Culture for Leishmania and aldehyde test.
7. Latex agglutination test for toxoplasmosis.

Mycology Section

Culture of all types of specimen for fungi.

Virology Section

1. Culture for isolation and identification of enteroviruses, viz., polio, coxsackie and echo.
2. Culture for Herpes Simplex Viruses.
3. Serological tests - e.g., neutralisation test for polio and coxsackie viruses.
4. RPHA for Hepatitis B surface antigen.
5. Serological tests - HAI for Arbovirus infection, viz., JE, Dengue, West Nile.
6. ELISA for HIV antibodies.

**PROCEDURES FOR COLLECTION AND TRANSPORT
OF SPECIMENS**

(A) GENERAL INSTRUCTIONS

1. The specimens should be properly labelled with:
 - name of the patient
 - time and date of the collection
 - ward and hospital number
2. It should be accompanied with the completed request form (appropriate forms must be used) furnishing the following details:
 - nature of the investigation asked for
 - patient's name, age, sex, hospital number/ward/OPD, etc.
 - clinical details in very brief along with history of any d r u g therapy
 - results of previous report, if any
 - nature of the specimens
3. The specimen should be collected in clean and sterile containers. Soiling of the exterior should always be avoided.
4. The specimen should be delivered to the laboratory immediately within 30 minutes of collection. In case of delay, specimens must be refrigerated (except CSF, pleural fluid, ascitic fluid and synovial fluid, which should be incubated at 37^EC).
5. Biopsy materials for investigations should be sent in sterile normal saline. Formalin must NOT be used.
6. Serum for serological tests:
 - a) 5 ml of blood: By vein puncture with all aseptic precautions, using dry sterile syringe, needle and container.
 - b) The specimen to be kept in the refrigerator until despatch.
7. Transport media and containers for special investigations are to be collected from the Department of Microbiology.

(B) SPECIAL INSTRUCTIONS

I. FOR BACTERIOLOGICAL INVESTIGATIONS

A) AEROBIC CULTURE

- i) Urine Culture
 - a) Mid stream urine obtained by "clean catch" technique following soap and water wash.
 - b) Urine to be sent in two bottles and a minimum of 15 ml is required if *S. typhi* is suspected.
- ii) Stool Culture
 - a) The stool/rectal swab to be collected in a clean container.
- iii) Exudate Culture
 - a) The nature of the specimen should be mentioned clearly.
 - b) A deep expectorated sputum (not saliva) must be sent.
 - c) I.V. catheter tips must be sent in a sterile container without any fluid. A short section (1") including the area directly beneath the skin should be aseptically cut off and sent.
 - d) To determine skin carriers, a swab from the perineal region and anterior nares should be collected.

B) ANAEROBIC CULTURE

Specimens should be collected in the special anaerobic culture transport media like gased-out vials and Cary Blair's media and sent immediately to the laboratory.

Recommended specimens are:

Aspirates from closed cavities and deep seated wounds.
Surgical specimens.

C) CULTURE OF MYCOBACTERIUM TUBERCULOSIS

- a) At least three consecutive specimens of sputum to be sent in wide mouth preferably sterile container.

D) BLOOD CULTURE

(Strict aseptic precautions to be maintained. Only autoclaved or disposable syringes to be used and skin should be decontaminated with alcohol/iodine/chlorhexidine)

- a) The Blood is to be obtained before antibiotic therapy is instituted.
- b) The blood should be collected in blood culture bottle supplied by the Department.
- c) Lift plaster from cap and pass blood into culture bottle through rubber liner, shake bottle (Do not open bottle).
- e) During night, if blood culture is required, the bottle may be kept in casualty incubator and sent to the laboratory next morning.

II. PARASITOLOGY INVESTIGATIONS

- a) A minimum of three faecal specimens collected over 1-2 weeks to be sent for ova, cyst and culture for *E. histolytica*.
- b) Both or thin blood smears to be sent for malarial and filarial parasites.

III. MYCOLOGY INVESTIGATIONS

(The sampling procedures vary for mycological investigations according to the area and type of tissue involved)

- a) Aseptic collection of scrapings, tissue bits, granules, aspirates, exudates and transudates in dry, sterile containers.
- b) Blood for fungal culture similar to bacterial culture.

IV. VIROLOGY INVESTIGATIONS: The following table shows the appropriate specimens to be collected for virological investigations.

Clinical Laboratory	Blood	Faeces ¹	Throat Swab ¹	Others
Aseptic meningitis Carditis	Paired Paired	+ +		CSF ² Pericardial Fluid ²
Encephalitis (acute SSPE)	Single	+		Brain Biopsy ¹ (when available CSF ²)
Endocarditis	Single			PM tissue (cardiac) Eye swab (or conjunctival scrapping)
Glandular fever	Paired			
Hepatitis A or B / Aids Mysitis Paralytic cases Pyrexia Post-mortem cases	Single ³ Paired Paired Paired Single	+ + ⁴ +		CSF ² Pathological tissue ²
Rash/Skin lesion Respiratory	Paired ⁵ Paired	+	1	Lesion sample ¹

- 1 To be sent in virus transport medium.
- 2 To be sent in dry sterile container.
- 3 Ensure no blood on neck or outside container. Use only "Universal" containers with rubber capped liners. Mark "High risk specimen".
- 4 Two faecal specimens.
- Specimens for attempted virus isolation should be collected as early as possible during the illness.
- 5 Paired (clotted 4-5ml) blood, 10-14 days apart to demonstrate antibody rise.

(C) BIOCHEMISTRY

TIME SCHEDULE FOR RECEIVING SAMPLES

1. Working hours: 9.00 am - 4.30 pm (lunch break
12.00 - 1.00 pm)
2. On working days: From wards: 9.00 am -10.30 am
From OPD: 9 am to 12 Noon.
3. Emergency samples: Round the clock on all days of
the week inclusive of Sundays
and other holidays for notified
investigations only.

PARTICULARS OF INVESTIGATIONS AND PROCEDURES

GENERAL INSTRUCTIONS

The following factors that *affect composition of body fluids* should be duly considered while interpreting the biochemical values:

Controllable Factors

Posture, hospitalisation, immobilisation, exercise, physical training, circadian variation, blindness, travel, food ingestion, beverages, smoking, alcohol, drugs, fever, shock, trauma, transfusion, etc.

Uncontrollable Factors

Age, gender, race, environment, geographical location, seasons, menstrual cycle, habits, dietary habits, etc.

The clinician should use the laboratory selectively and judiciously in the best interests of patients. In interpreting the results, the following facts should be borne in mind, in addition to what had been said earlier:

1. The relationship of a result to a reference range only indicates the probability that it is normal or abnormal.
2. There are physiological differences in normal ranges and physiological variations from day to day.
3. There are small day to day variations in results due to technical factors and reference ranges may vary from laboratory to laboratory and with the technique employed.
4. Changes in a given constituent may be non-specific and unrelated to a primary defect in the metabolism of that constituents.

SPECIAL INSTRUCTIONS

1. The reverse page of the requisition form should be ticked for appropriate investigations requested for.
2. Any specific instruction or information required should be clearly indicated.
3. Samples collected for biochemical investigations should be sent to the laboratory within thirty minutes of collection.
4. In case of delay, samples must be refrigerated and sent as soon as possible, but this information should be intimated.
5. Samples sent for biochemical analysis with incomplete information will not be processed for analysis.

AUTO ANALYSER ASSAYS

Most of the routine investigations are done on Auto Analyser. For that, 3 ml of blood has to be sent (in plain bottle) for 4 investigations and 5 ml for more than 4 analytes.

SAMPLE REQUIREMENTS FOR MANUAL METHODS OF ASSAY

SERUM / PLASMA INVESTIGATIONS

1. For assay of one or two analyte, send 3 ml of clotted blood, unless otherwise specified.
2. For assay of more than two analytes, send 5 ml of clotted blood, unless otherwise specified.

ROUTINE INVESTIGATIONS [3 ml of blood in plain bottle]

- | | |
|-------------------|--------------------------------------|
| 1. Total proteins | 12. Uric acid |
| 2. Albumin | 13. Bilirubin, total |
| 3. Globulin | 14. Bilirubin, conjugated |
| 4. Cholesterol | 15. Alkaline phosphatase (ALP) |
| 5. Sodium | 16. Alkaline amino transferase (ALT) |
| 6. Potassium | 17. Asparate amino transferase (AST) |
| 7. Chloride | 18. Amylase |
| 8. Calcium | 19. Acid phosphatase |
| 9. Phosphorus | |
| 10. Iron | |
| 11. Creatinine | |

20. Plasma bicarbonate (Done as part of blood gas analysis)

21. Plasma fibrinogen (5 ml of blood in bottle provided by Clinical Biochemistry Laboratory)

22. Plasma prothrombin time (PT) (1.8 ml of blood to be syringed into the given tube/bottle containing 0.2 ml of anti-coagulant solution)

FLUIDS: (Sample contaminated with blood is unfit for quantitative biochemical analysis)

- | | | |
|-------------------------|----------|------------------------|
| 1. Cerebrospinal fluid: | Protein | - 3 ml in plain bottle |
| | Sugar | - " |
| | Chloride | - " |
| 2. Ascitic fluid: | Protein | - 1 ml in plain bottle |
| 3. Pleural fluid: | Protein | - " |
| 4. Peritoneal fluid: | Protein | - " |

SPECIAL INVESTIGATIONS (on prior fixation / after consultation):

Serum Assays: (3 ml of clotted blood in plain bottle)

1. Triglycerides	8. Electrophoresis of serum proteins/ lipoproteins
2. HDL (High Density Lipoprotein)	9. Serum Iron
3. Total Lactate Dehydrogenase (LDH)	10. Total Iron binding capacity
4. Ceruloplasmin	11. Blood - Non-protein nitrogen
5. Magnesium	12. Blood Ammonia
6. Creatinine Kinase	
7. Creatinine Kinase (MB)	

Urinalysis:

(The department has to be contacted either for obtaining the preservatives or for some other requirements regarding the 24 hour collection of urine; volume of 24 hour urine to be measured and noted)

1. Urine Sample for each test: 20 ml
2. Bence -Jone Protein (Qualitative)
3. Calcium (24 hr collection)
4. Lipids and Chyle (screening)
5. Phosphate (24 hr collection)
6. Porphobilinogen (screening)
7. Porphyrins (screening)
8. Urobilinogen (screening)
9. Protein (24 hr collection)
10. Creatinine (24 hr collection)
11. Chromatography for amino acids

Clearance Tests:

1. Creatinine - Blood and urine samples are per protocol
2. Urea - Blood and urine samples are per protocol
3. Acid Mucopolysaccharides (screening test) - 10 ml
4. Calculi Analysis - 10 ml
5. 5-hydroxy indole acetic acid (screening) - 10 ml
6. Occult blood in urine - 5 ml

Glucose Tolerance Test (Prior date fixation with the laboratory is necessary for proper advice to patient)

Blood Gas Analysis for PH 2 ml of heparinised arterial
PCO₂, PO₂, Na⁺, K⁺, Ca⁺⁺, Blood sample
Hb, etc.

Hormonal Assay T3, T4, TSH 5 ml of blood

Haemoglobin spectroscopy 2 ml of whole blood

Other hormonal assays depending
on the availability of Kits .. 3 ml of blood
Prostate specific antigen .. 3 ml of blood

Important Note: Requisition forms should be countersigned by a
Unit Consultant for all hormonal assays and special investigations

EMERGENCY INVESTIGATIONS: ROUND-THE-CLOCK

1. Blood Glucose
2. Blood Urea
3. Serum electrolytes
4. Serum bilirubin : For neonatal cases only
5. Serum creatinine : For life saving conditions only
6. Serum Asparate amino-transferase (AST) : For Myocardial
infarction cases only
7. Serum Amylase
8. Prothrombin time : On prior consultation
9. Serum Calcium : For tetany cases only
10. Blood gas analysis : With prior intimation

ANY OTHER SPECIAL INVESTIGATIONS

Any other special requirement / assay for patient care or research may be discussed with a
faculty member of the department

(D) PHARMACOLOGY

Name	Sample Value	Time of collection
Drugs: Phenobarbitone Phenytoin Carbamazepine Theophylline Paracetamol Salicylic acid Digoxin	8 ml of whole blood in a plain bottle	For suspected therapeutic failure: Just before the next dose For suspected drug toxicity: 2 hours after the last dose
Hormones: FSH LH Oestradiol Testosterone Prolactin	10 ml of whole blood in a plain bottle	For Cortisol - between 4 am and 8 am. Other hormones - preferably in the morning. Female sex hormones - day of menstrual cycle needs to be recorded.
Others: VMA	Collect the urine for 24 hours using 10 ml of 6 N HCl as preservative. The specimen should be refrigerated during collection. Measure the total volume and send an aliquot of 50 ml for investigation.	Patient should abstain from banana, ice-cream, chocolate, tea, coffee, foods containing vanilla, citrus fruits, and drugs such as aspirin and anti-hypertensive agents, at least 2 days before the collection period.

- Note:
1. Prior appointment has to be made with HPLC Laboratory for all estimations.
 2. Special requisition form issued by HPLC Laboratory, duly filled and signed by the Head of the Unit, must accompany all the samples.
 3. Samples should be sent to HPLC Laboratory before noon.

(E) RADIOTHERAPY

Investigations offered: Thyroid Scan using Radio Iodine-131

Contra-indications:

1. Pregnancy (especially in 1st trimester) - ask for history of amenorrhoea.
2. Lactation - Advise avoidance of breast-feeding for 7 days after iodine administration.

Preparation:

1. Patient should be fasting on the date of the investigation.
2. Patient should stop all iodine containing drugs/anti-thyroid drugs for at least 10 days prior to the investigation.

(F) PHYSIOLOGY

Tests conducted:

1. Motor and sensory conduction tests
2. Electromyogram (EMG)
3. Somato-sensory evoked potentials
4. Visual evoked potentials
5. Auditory evoked potential (BERA)
6. Pulmonary function tests (FVC, FEV1 & PEFr)
7. Basal metabolic rate (BMR)

Date and time:

Routine cases: Monday, Tuesday, Wednesday, Thursday (FN)
Date and time to be fixed in advance.

7. LABORATORY REFERENCE RANGES
(A) CLINICAL BIOCHEMISTRY

Sl.No.		Reference Range	
	SERUM ANALYTE:		
1.	Albumin	3.5 - 5.3	g/dL
2.	AST*	6 - 38	Iu/L
3.	ALT*	5 - 35	Iu/L
4.	Alkaline phosphatase*	31 - 115	Iu/L
5.	Amylase*	14 - 72	Iu/L
6.	Acid phosphatase*	0 - 5.1	Iu/L
7.	Ammonia*	40 - 80	Fgm/dL
8.	Bilirubin (direct)	0 - 0.2	mg/dL
9.	Bilirubin (total)	0.2 - 1	mg/dL
10.	Bicarbonate	18 - 22	mmol/L
11.	Creatinine Kinase*	26 - 173	Iu/L
12.	Cholesterol (total)	150 - 240	mg/dL
13.	Cholesterol (HDL):		
	Female (15-45 yrs.)	30 - 80	mg/dL
	Male	30 - 60	mg/dL
14.	Calcium (total)	8.4 - 10.8	mg/dL
15.	Calcium (ionised)	4.2 - 5.2	mg/dL
16.	Chloride	95 - 105	meq/L
17.	Creatinine	0.7 - 1.5	mg/dL
18.	GGT*	0 - 53	Iu/L
19.	Glucose (fasting)	70 - 105	mg/dL
20.	Glucose (2 hrs post-prandial)	< 140	mg/dL
21.	Growth hormone	0 - 10	ngm/ml
22.	Iron	60 - 120	Fmg/dL
23.	Insulin	5 - 30	Fu/ml
24.	Magnesium	1.3 - 2.1	meq/L
25.	Phosphorus	2.7 - 4.5	mg/dL
26.	Protein (total)	6 - 8.3	g/dL
27.	Potassium	3 - 5	meq/L
28.	Sodium	135 - 145	meq/L

Sl.No.		Reference Range	
29.	Triglycerides	35 - 160	mg/dL
30.	Tri-iodothyronine	70 - 200	ngm/dL
31.	Thyroxine	5.5 - 13.5	Fgm/dL
32.	TSH	0.2 - 5.1	Fu/ml
33.	Uric acid	2.6 - 7.2	mg/dL
34.	Urea	16 - 40	mg/dL
35.	Blood urea nitrogen	8 - 17	mg/dL
CEREBRO-SPINAL FLUID ANALYSIS:			
1.	Glucose	45 - 75	mg/dL
2.	Protein	15 - 45	mg/dL
3.	Chloride	120 - 135	meq/L

* The reference ranges may vary with the reagent kit used.

Note:

These values are consistent with reference values for a normal adult. Please contact the Clinical Biochemistry Laboratory for any clarification.

(B) HAEMATOLOGY

	S.I. Units	Conventional Units
RBC count Males Females	5.5 ± 1.0 x 10 ¹² /l 4.8 ± 1.0 x 10 ¹² /l	5.5 ± 1.0 million/cumm 4.8 ± 1.0 million/cumm
Haemoglobin Males Females	155 ± 25 g/l 140 ± 25 g/l	15.5 ± 2.5 g/dl 14.0 ± 2.5 g/dl
Haematocrit Males Females	0.47 ± 0.07 0.42 ± 0.05	
MCV Adults MCH Adults MCHC Adults	86 ± 10 fl 29.5 ± 2.5 pg 325 ± 25 g/l	32.5 ± 2.5 g/dl
Reticulocytes	0.2 - 2%	
Total leucocyte count	7.5 ± 3.5 x 10 ⁹ /l	4000 - 11000/cumm
Platelet count	150 - 400 x 10 ⁹ /l	1.5 lakhs - 4 lakhs/ cumm
Bleeding time (Ivy's)	2 - 7 mins.	
Clotting time (Lee & White's 37E)	4 - 11 min.	
PT	10 - 14 secs. >2 secs of control taken as abnormal.	
APTT	35 - 43 secs. >6 secs of control taken as abnormal.	
ESR (Westergren) M F	1-10 mm/hr 1-15 mm/hr	
ESR (Wintrobe) M F	1-10 mm/hr 1-20 mm/hr	

(C) MICROBIOLOGY

Section	Investigation	Reference Range
Immunology	VDRL	Reactive / Non-reactive Cut off titre: 8
	Widal:	80 (equivocal) 160 (indicative of infection)
	T _O	80 (equivocal) 160 (indicative of infection)
	T _H	> 160 (indicative of infection) > 160 (indicative of infection)
	A _H B _H	Titre: 80-160 (indicative) > 320 (conclusive, even in single specimen)
	Brucella Aggluti- nation Test	Positive or Negative
Rheumatoid factor detection by Latex Agglutination	Cut off titre: >200 IU/ml	
ASLO titre (Latex Agglutination)		
Virology	RPHA FPR Hbs Ag.	Positive or Negative
HIV Lab	ELISA for HIV	Reactive (+ve) Non-reactive (-ve)
Parasitology	IgM ELISA for Toxoplasmosis	Negative / Equivocal / Positive
	IHA for Amoebiasis	Cut off titre: >128
	IHA for Filariasis	Cut off titre: >128
	IHA for Hydatidosis	Cut off titre: >128

Appendix

Grading of quality of available evidence: Category of evidence

Ia- meta-analysis of randomized controlled trials

Ib- at least one randomized controlled trial

IIa- at least one controlled study without randomization

IIb- at least one other type of quasi-experimental study

III- non-experimental, descriptive studies, such as comparative studies, correlation studies, and case studies

IV- expert committee reports or the opinions or clinical experience of respected authorities, or both

Strength of recommendation

Grade A (levels Ia and Ib)- at least one randomized controlled trial as part of the body of literature of overall good quality and consistency addressing specific recommendations

Grade B (levels IIa, IIb, and III)- availability of well conducted clinical studies, but no randomized clinical trials on the topic of recommendation

Grade C (level IV)- evidence obtained from expert committee reports or the opinions or clinical experience of respected authorities, or both. Indicates absence of directly applicable clinical studies of good quality

Source: US Department of Health and Human Services. (AHCPR publication No 92-0023).

Notes

Notes