DIRECTORY OF SERVICES & PRIMARY SAMPLE COLLECTION MANUAL -2017 : FMMCHL

FATHER MULLER MEDICAL COLLEGE HOSPITAL LABORATORY (FMMCHL),

FATHER MULLER MEDICAL COLLEGE HOSPITAL (FMMCH),

FATHER MULLER CHARITABLE INSTITUTIONS (FMCI),

MANGALORE- 575002.

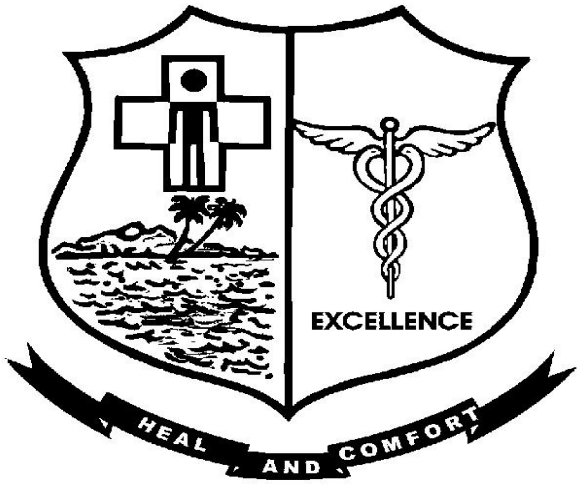

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TABLE OF CONTENTS

Sl.No.	Contents	Page No.
A	Title Page	1 of 197
B	Table of Contents	2 of 197
C	Scope	5 of 197
1	Introduction to FMMCHL	6 of 197
2	General Information on Lab Services	Page 9 onwards
	2.1. Contact Details	9 of 197
	2.2. Lab Timings	10 of 197
	2.3. Organogram	11 of 197
	2.4. Lab charges	12 of 197
	2.5. User Feedback	12 of 197
	2.6. User Information materials	12 of 197
	2.7. Advisory services	13 of 197
	2.8. Ethics in FMMCHL	14 of 197
	2.9. Tests Available	16 of 197
	2.10. Referral labs	17 of 197
	2.11. Turn around time	17 of 197

	2.12. Quality control	18 of 197
	2.13. Rejection of samples	18 of 197
	2.14. Requests for additional testing	19 of 197
	2.15. Reporting of results	19 of 197
	2.16 .Remittance of charges in case of non-testing	19 of 197
	2.17. Transport of samples from outside to FMMCHL	19 of 197
3	General Instructions on sample collection	22 onwards
	3.1. General Instructions for Patient Preparation	22 of 197
	3.2. Precautions to be taken by personnel collecting sample	22 of 197
	3.3. Venipuncture guidelines : materials, safety, procedure, order of draw, infant/child phlebotomy	23 of 197
	3.4. Collection from Central Line	34 of 197
	3.5. Trouble shooting in Phlebotomy	37 of 197
	3.6. Arterial Blood Collection	37 of 197
	3.7. Interferring factors	41 of 197
	3.8. C.S.F. Collection	43 of 197
	3.9. Instructions for self monitoring of blood glucose	47 of 197
	3.10. Oral GTT	49 of 197
	3.11. Instructions for collection of urine (Random/Spot)	51 of 197
	3.12. Instructions for collection of 24 hours urine –Outpatient	51 of 197

	3.13. Instructions for collection of 24 hours urine -Inpatient	52 of 197
	3.14. Preservatives for 24 hours urine	53 of 197
	3.15. Instructions for semen collection	54 of 197
	3.16. Disposal of biomedical waste	55 of 197
	3.17. Monitoring samples transported from outside	59 of 197
	3.18. Sample rejection criteria for OP sample collection area and lab sample reception :Preliminary rejection	60 of 197
	3.19. In house transport of samples	62 of 197
	3.20. Sample rejection criteria for lab and actions to be taken : Rejection at the lab section level	64 of 197
	3.21. Sending samples from FMMCHL to referral labs	67 of 197
4	Specific Information on Biochemistry : List of tests, sample requirements, transport conditions and turnaround time	68 of 197
5	Specific Information on Microbiology	113 onwards
5.1.	General instructions for sample collection and transport for Microbiology tests	113 of 197
5.2.	Sample collection for routine culture	115 of 197
5.3.	Sample collection for mycobacterial culture	117 of 197
5.4.	Sample collection for anaerobic culture	117 of 197
5.5.	Sample collection for fungi	121 of 197
5.6.	Collection of blood samples for serology	122 of 197
5.7.	Central venous catheter tip (CVC) collection	122 of 197

5.8.	Sample Rejection criteria in microbiology	123 of 197
5.9.	List of tests in Microbiology : sample requirements , transport conditions and turnaround time	125 of 197
5.10.	Time limit for requesting additional tests	141 of 197
5.11.	Factors influencing test results	142 of 197
6	Specific Information on Histopathology & Cytology : List of tests, sample requirements, transport and turnaround time	143 of 197
7	Specific Information on Hematology & Clinical Pathology : List of tests, sample requirements, transport and turnaround time	153 of 197

Scope of the Document

This manual provides information on FMMCHL, scope of services, sample collection procedures, information on all the tests done in FMMCHL w.r.t. sample collection & transport, clinical utility, turnaround time and safety aspects. The manual is for the use of all laboratory staff, patients, clinicians and nursing staff.

Hard copies of the manual are made available in OP sample collection Center for the users to refer . Soft copy of the manual is made available to in house use only, in the Backbone HIS.

This manual is prepared based on the guidelines of ISO 15189:2012, NABL 112, WHO and NCCLS .

1. INTRODUCTION

Father Muller Medial College Hospital (FMMCH), a part of Father Muller Charitable Institutions (FMCI) is a 1500 bedded multi-specialty hospital that caters to about 800 out patients and 150 new admissions as In-Patients daily. The Institution renders its services in health care to all people irrespective of religion, caste or community, and socioeconomic background.

Father Muller Medical College Hospital Laboratory (FMMCHL) is a Medical testing laboratory catering to about 900 samples every day qualifying this as a large laboratory.

The lab offers its diagnostic services to Patients attending Out Patient Department as well as to the In-Patients.

FMMCHL comprises of following sections: Clinical Biochemistry, Hematology, Clinical Pathology, Histopathology, Cytology and Microbiology (Bacteriology, virology, serology, mycology). The various sections of FMMCHL are located at one premise within FMMCH. The lab has a sample collection center for outpatients within the premises of FMMCH.

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Vision of FMCI :

"To heal and comfort the suffering humanity with compassion and respect and to be recognized as a global leader in Medical Education and Research."

Mission of FMCI :

- To be progressive in providing holistic health care services to all.
- To establish and operate hospitals with state-of-the-art facility.
- To create and foster centers of excellence in medical education and research
- As a charitable institution, to be a pioneer in reaching out to be marginalized.
- To be recognized as a Global leader in providing quality patient care, best medical education and research responsive to society's needs.

Vision of FMMCHL :

To be the premier provider of medical laboratory services with credibility and continual quality improvement .

Mission of FMMCHL :

1) To provide comprehensive, high-quality laboratory testing at par with global standards
2) Commitment to good professional practice, and providing the services to the users as per the principles of autonomy, beneficence, non-malificence and justice

Quality Policy of FMMCHL :

- FMMCHL carries out its testing activities complying with ISO 15189:2012, NABL 112, NABH, Regulatory authorities & Statutory Requirements, with continual improvement in quality.
- FMMCHL is committed to good professional practice and provide its services at par with global standards to customers without any discrimination.
- FMMCHL management ensures that its staff shall imbibe the vision & mission of Father Muller Charitable Institutions.

2. GENERAL INFORMATION

2.1. Contact Details:

2.1.1. Postal Address : Father Muller Medical College Hospital , Kankanady, Mangalore-575002.

2.1.2. Web Site of FMCI : www. Fathermuller.edu.in

2.1.3. Hospital Fax – 0824-2436661

2.1.4. Telephone, Father Muller Hospital (Main) : 0824 2238000

2.1.5. Telephone , Administrator, FMMCH : 0824 2238453

2.1.6. Telephone Nos. for Lab :

OP sample collection center : 0824 223 8353

Lab Reception (outsourcing and sample reception) : 0824 2238141

Hematology & Clinical Pathology : 0824 2238142

Microbiology : 0824 2238143

Biochemistry : 0824 2238144

Cytology : 0824 2238374

Histopathology : 0824 2238375

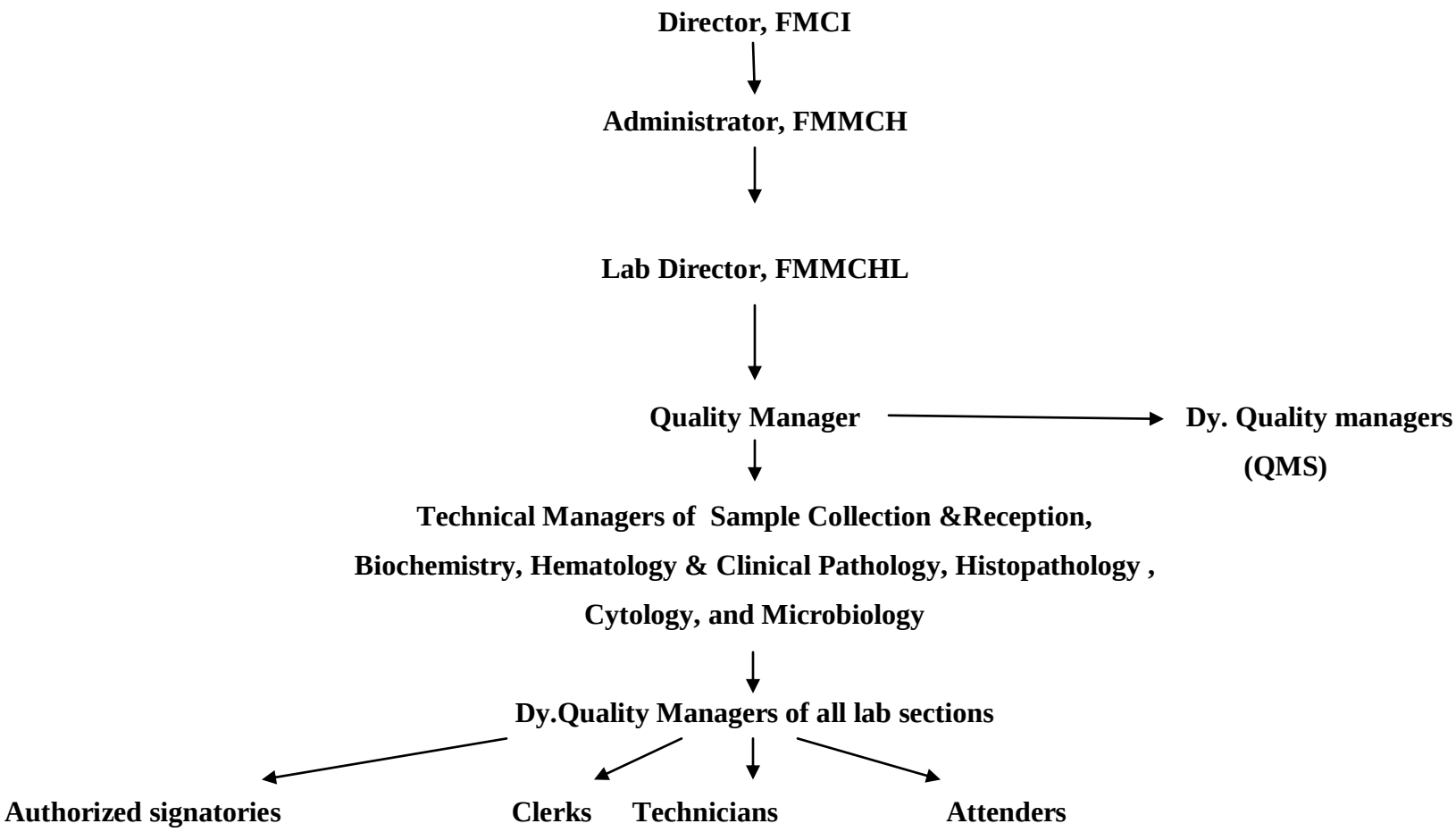
Mobile Number of Quality Manager (Dr.Shivashankara A.R.) : 9880146133.

2.1.7. E mail : fmmccentrallab@gmail.com (lab reception); frmullersamplecollection@gmail.com (OP sample collection center); arshiva72@gmail.com (Quality Manager); tumashankar@hotmail.com (Lab Director).

2.2. Lab Timings :

Department / Activity	Working Days	Opening hours
Laboratory reception (Main Lab Premises) for – Sample Reception and Referral lab services (Outsourcing tests to outside labs if required)	Monday -Sunday	24 hours Service
OP Sample Collection Center (Ground Floor)	Monday - Sunday	24 hours service
Biochemistry	Monday -Sunday	24 hours Service
Hematology & Clinical Pathology	Monday -Sunday	24 hours Service
Microbiology	Monday -Sunday	24 hours Service
Cytology	Monday -Saturday	8.30 AM – 5.30 PM
Histopathology	Monday -Saturday	8.30M – 5.30 PM

2.3. Organogram of Lab :



2.4. Lab Charges : Charges for tests done in FMMCHL are mentioned in schedule of charges available in hospital enquiry, billing and OP sample collection center. Electronically , charges are available in Billing section.

2.5. User feedback :

1) Feedback From Patients / OP visitors : Feedback forms are available in the OP sample collection center. Please fill the form and place the form in the suggestion box provided in front of OP sample collection center. Feedback can also be given by E mail to the mail IDs mentioned above.

2) Feedback From Clinicians : FMMCHL collects written feedback from Clinicians once in six months. In addition, the lab entertains feedback during weekly audit committee meetings of the hospital, and by e mail and telephonically any time.

3) Complaints : If there are any complaints on lab services which need to addressed immediately, patients and other users of lab services (clinicians, nursing staff, etc..) may fill the complaint form, and hand it over to OP collection center, Lab Reception or may send it directly to Quality manager. The lab also entertains complaints through e mail and telephone. For any complaints and feedback, the users may contact the Quality manager or Lab Director also by telephone (mobile phone through the FMMCH Main no.(08242238000). The complaints and feedback from users will be addressed and the complainant will be informed of the action taken .

2.6. Availability of User Information Materials:

1) **Directory of services and Sample Collection Manual**- is available as a hard copy in OP sample collection center and Lab Reception, for the use of lab staff, clinicians and nursing staff, and also for the other users to refer. Electronic copy is available for the use of lab staff, clinicians and nursing staff in "Backbone HIS".

2) **Brochures on sample collection** (urine and semen) - are available in OP sample collection center.

3) **Request Forms** : List of tests done and brief information on samples is available .

The laboratory has a number of different request forms. They are used for different Laboratory analyses. It is important that the correct form is supplied for a particular test.

Following are the types of request forms for Biochemistry ; Hematology ; Peripheral Smear,; Bone Marrow and Semen analysis ; Microbiology ; Cytology ; Gynec cytology; Histopathology

There are separate request forms for Urgent Test Requests (Pink Forms).

4) **Displays in the OP sample collection center** - provide quick information to users on general instructions to be followed, turnaround time for tests and quality policy of lab.

2.7. Advisory Services of FMMCHL :

FMMCHL offers value added services to its customers by way of providing clarifications regarding technical matters. FMMCHL has established arrangements for communicating with users on choice of examinations and use of the services, sample requirements, clinical indications, limitations of examination procedures, and frequency of requesting the examination.

These communication means include directory of services, primary sample collection manual, request forms, interpretations of test results in reports , participation in audit meetings of FMMCH ,CME programmes on lab related topics where clinicians are invited as audience , letters for introduction of new tests , and interactive meetings of lab staff with clinicians. Where appropriate, interpretation of the results of examination are provided. The technical management offers consultative advice/opinions/suggestions to their clinical colleagues when necessary. When there is any major delay/deviation this is informed to the clinicians. Any retesting/repeat sampling required to confirm a test result is also notified and explained.

FMMCHL consultants (Biochemists, Pathologists and Microbiologists) are available for consultation if the patients ask for any advisory services .

2.8. Ethics in FMMCHL :

- FMMCHL follows ethical principles of autonomy, justice, beneficence and non maleficence. FMMCHL and its individual sections offer its services keeping the patients welfare as its paramount interest. It is the responsibility of all the professionals working in FMMCHL and its individual sections of FMCI to ensure that the following four principles are practiced. The patient's right to privacy and confidentiality of data /lab reports are also important to the practice of laboratory medicine. The information gathered from the patient and the records created about the patient are for his / her benefit. The information will not be disclosed to a third party without the patient's consent unless it is a medico legal case.
- Staff collect the basic information from patients, which include name, sex, age, hospital ID, status of fasting/postprandial, medications, which are required for correct identification of patients and interpretation of results. No unnecessary personal information is collected. The reason for collection of information is explained to the patient.

- Adequate information is provided to the patient in an understandable language, on sample collection procedure and the tests to be performed. Information brochures, displays, primary sample collection manual and directory of services are made available to the users for their information. Written informed consent is taken from the patients/care givers for HIV testing, bone marrow aspiration and fine needle aspiration cytology. For other tests done in various sections of FMMCHL, submission of the patient for the sample collection is implied as consent.
- Adequate privacy is provided in the sample collection area, appropriate to the type of specimen collected.
- The patients are given information about the turnaround time of tests requested. In case of any delay due to unexpected circumstances, the patients are given information.
- Patients are treated with respect and courtesy by the staff of FMMCHL.
- FMMCHL takes feedback from users. Users are requested to grade courtesy of staff, explanation about tests and sample collection procedures, comfortness in phlebotomy area, and turnaround time. FMMCHL entertains any complaints from users.
- The consultants in FMMCHL are available to provide any advisory service to patients on tests and interpretation of results.
- Any tests which cannot be carried out by the lab under appropriate standard conditions are refused by the laboratory and informed to the patient before collection of samples.
- In case of tests which are not performed by FMMCHL and in unforeseen circumstances such as instrument breakdowns, wherever possible FMMCHL takes responsibility of sending the samples to a referral laboratory. FMMCHL takes responsibility of informing the patients for such procedures.
- FMMCHL takes care of patient safety .The lab has a safety committee whose responsibility is to ensure good lab safety practices, give training to staff on safety aspects, do safety audit and ensure appropriate corrective and preventive actions in case of nonconformities. These measures help to prevent hazard from fire, electrical, chemical and infectious materials.

- The biomedical waste in sample collection areas (needles, syringes, gloves, infected paper towels/tissue papers, cotton, etc.) is disposed in accordance with standard guidelines. FMMCHL has ensured good housekeeping practices in sample collection area, waiting area and toilets.

2.9. Tests Available in FMMCHL ;

The tests done in FMMCHL are available under following lab sections :

1) **Hematology , Immunohematology and Clinical Pathology** : Complete blood count, ESR, Hemoglobin, Coagulation Studies, Test for Malarial Parasite, Test for G6PD deficiency, Peripheral Smear, Tests for Hemoglobinopathies, Test for Microfilaria, Urine Analysis, Semen Analysis, Body Fluid Analysis, and Bone Marrow Studies.
2) **Biochemistry :** All routine tests including glucose, lipid profile, renal function tests, liver function tests, enzymes, cardiac markers, electrolytes, arterial blood gas analysis, and various special tests – hormones, tumor markers, serum protein electrophoresis and hemoglobin electrophoresis.
3) **Cytology** : FNAC, Immunocytochemistry on FNA smears and fluid smears; all routine cytological tests –Cytology of body fluids, and Cell block cytology.
4) **Histopathology** : Direct immunofluorescence test for skin biopsies, new IHC markers (anti HSA, Anti TTF-1, Anti Epithelial specific antigen, anti cadhesin, Moc-31 and Calretinin ; all routine histopathological tests – Frozen section, tissue biopsy, bone marrow biopsy.
5) **Microbiology** : Routine tests in Bacteriology, Virology, Mycology sections; using recent methods for testing of HIV, Hepatitis, Tuberculosis and Dengue. Equipped with Bactec automated culture , and Xpert MTB/RIF- an automated real time nucleic acid amplification technology for rapid and simultaneous detection of tuberculosis and rifampicin resistance.

Description of tests, samples required, turn around time and clinical indications are given later in this document.

2.10. Referral Labs :

The tests which are not done in FMMCHL are outsourced to referral labs. FMMCHL has a documented procedure for selecting and evaluating referral laboratories. FMMCHL selects the referral labs based on their criteria such as accreditation of referral lab by accrediting agencies (NABL, CAP), implementation of quality control programme in the referral lab, logistics to the referral lab and reputation of the lab. FMMCHL is responsible for selecting a referral laboratory. FMMCHL holds consultation with users wherever required. Suggestions from clinicians are taken into consideration in selecting referral laboratories.

FMMCHL is responsible for sending samples to referral labs and for providing test results. FMMCHL is always open to interactions among clinicians and lab specialists from FMMCHL and referral labs. This process is not hindered by financial or commercial considerations. Any tests which cannot be carried out by the lab under appropriate standard conditions are refused by the laboratory and informed to the patient before collection of samples.

In case of tests which are not performed by FMMCHL and in unforeseen circumstances such as instrument breakdowns, wherever possible FMMCHL takes responsibility of sending the samples to a referral laboratory. FMMCHL takes responsibility of informing the patients for such procedures.

2.11. Turnaround Time :

For outpatient tests, the turnaround time(TAT) is the Time from Sample collection to Result availability after signature from authorized signatories. For Inpatient tests, TAT is from receiving the sample in the lab to availability of provisional results. For urgent test requests, TAT is shorter (STAT). The TAT and STAT of tests are mentioned later for all tests in FMMCHL.

2.12 . Quality Control in FMMCHL : FMMCHL has an internal quality control programme for all the tests done. FMMCHL participates in external quality control programmes to ensure accuracy of its test results. The external organizations with which FMMCHL is registered for external quality control, are as follows:

1) Biochemistry : BIORAD, USA
2) Hematology & Clinical Pathology : CMC Vellore and AIIMS, New Delhi
3) Cytology :PGIMER, Chandigarh
4) Histopathology : ILQA Bangalore
5) Microbiology : Indian Association of Microbiologists

2.13. Rejection of Samples : Samples are rejected in the lab in case of :

1) Incorrect specimen
2) Wrong containers/vacutainers
3) Sample-Requisition form mismatch
4) Leaking containers
5) Inappropriate transport conditions
6) Hemolyzed sample
7) Clotted samples
8) Insufficient sample

In case of a sample rejection, the nursing staff of wards, and OP sample collection center staff are informed immediately, and a prompt attempt is made to collect a repeat sample for analysis.

2.14. Requests for Additional Testing:

FMMCHL entertains verbal requests for additional testing in a primary sample already sent to lab. If on sending a specimen for testing and further **additional testing** is required, please contact the appropriate section of the Laboratory to investigate the feasibility of using the primary specimen for analysis as age of specimen may have impact on the validity of test results. Ideally, a request form should accompany a additional request but ,the lack of the request form should not impede the processing of an urgent request. Verbal request for additional tests should be accompanied by a written request later before the dispatch of reports.

2.15. Reporting the Results:

All results, once released, are available on the hospital information system.

Printed reports are issued to outpatients on submitting the bill. Request for reports by telephone are not entertained. FMMCHL sends lab reports by e mail on request from customers.

For inpatient wards, provisional reports are available once the results are entered in the system. Printing the reports is possible only after authorization from authorized signatories of lab. It is the policy of the Laboratory to telephone reports only when results for specific clinical parameters have reached critical levels and there is urgency for primary management. Request for verbal reports are not entertained except in urgent cases.

2.16. Policy for remittance of charges in case of non-testing :

In case of non-testing of already collected specimen due to any reason, FMMCHL credits the already paid charges to the customer.

2.17. Sending specimen from Outside hospitals/ labs to FMMCHL :

Packing procedure for the transport of diagnostic specimens

Specimen to be sent should be collected in a suitable primary container (vacutainers for blood samples; sterile plastic bottles for urine, body fluids, sputum and semen samples ; sterile plastic container for stool samples for microbiology tests; and narrow mouth containers with stick for stool samples for clinical pathology.

For Histopathology tests, use the appropriate container provided by FMMCHL.

Please refer to the DOS & Primary sample collection manual provided by FMMCHL, for details of containers and type of samples to be collected for each test done in FMMCHL.

The referring labs/hospitals could get the containers issued from FMMCHL or could use the appropriate containers as specified above. Ensure that all specimen container caps/lids are properly tightened to prevent leakage. Label the container properly with patient name, age, gender and patient ID No. from the hospital/lab which is sending sample.

1. Wrap the container in tissue paper or cotton wool, which will act as absorbent material in event of any spillages.

2. This will be placed in a plastic bag/pouch. In case of transport from those places requiring more than two hours to reach FMMCHL, Pre frozen gel pack (ice pack) should be placed along with specimen . This is applicable to test requests for biochemistry, microbiology, body fluids (cell count, cell type and cytology) , and clinical pathology (urine samples). Between specimen container and gel pack place a sponge to avoid any damage to specimen container.

Please note : It is preferable to centrifuge the blood samples (in case of tests requiring serum or plasma) for transports requiring more than 2 hours, in order to avoid hemolysis . For arterial blood gas analysis, the maximum time allowed (from sample collection)for the sample to reach FMMCHL is 10 minutes, and the sample should be sent in ice box. For plasma ammonia and

lactate, the sample should be sent in ice box, and maximum time allowed from sample collection to reaching FMMCHL is 30 minutes .

3. Properly fill the requisition form.

4. Place the requisition form in the plastic pouch/bag, along with specimen containers (already wrapped in tissue paper or cotton wool).

5. All these should be placed in a transport box made up of smooth impervious material such as plastic or metal. Label the box with a hazard-warning label **'Diagnostic Specimen'**. Place the name, address and contact number of the destination laboratory on the outside of the envelope.

6. Place the name, address and contact number of the originator (sender) on the outside of the envelope.

7. The specimen can be transported or posted as appropriate.

8. In case of specimen transported by post, An outer form of packaging such as padded envelope (jiffy bag) must be used to post the specimen. Ordinary envelopes should not be used. The package must be clearly marked "diagnostic specimen – fragile , handle with care". It must also show information on whom to contact in case of loss, damage or leakage.

3. General Instructions on Patient Preparation and Sample Collection

3.1. GENERAL INSTRUCTIONS ON PATIENT PREPARATION:

- Patient is informed about the nature of sample to be collected and the tests to be carried out.
- Patient should not have undergone vigorous exercise prior to the test.
- It is necessary to find out if the patient is under any medication.
- The day before and also on the day of test, the patient should not consume
- Intoxicating substances.
- Do not collect the sample when the patient is under emotional stress, make him/her comfortable.

3.2. PRECAUTIONS TO BE TAKEN BY THE PERSONNEL COLLECTING THE SAMPLE:

1) Fill the particulars of the patient in the requisition form.
2) Label the containers appropriately before collecting the sample.
3) Collect in appropriate containers.
4) Collect appropriate volume
5) Collect at appropriate time
6) Use proper collection technique
7) Use appropriate Tube draw or syringe draw order (Preferably Tube draw order)

3.3. SAMPLE COLLECTION TECHNIQUE : ROUTINE VENIPUNCTURE GUIDELINES:

3.3.1. MATERIALS

I) Safety Needles, 22 gauge or less

2) Butterfly needles. 21 gauge or less

3) Syringes

4) Blood Collection Tubes. The vacuum tubes are designed to draw a predetermined volume of blood. Tubes with different additives are used for collecting blood specimens for specific types of tests. The color of the rubber stopper is used to identify these additives. See Selecting the Appropriate Collection Tube and Specimen Container Types.

5) Tourniquets. Latex-free tourniquets are available

6) Antiseptic. Individually packaged 70% isopropyl alcohol wipes.

7) 2x2 Gauze or cotton balls.

8) Sharps Disposal Container. An OSHA acceptable, puncture proof container marked "Biohazardous".

9) Bandages or tape

3.3.2. SAFETY

1) Observe universal (standard) safety precautions. Observe all applicable isolation procedures.
2) PPE's should be worn at all time while collecting samples.
3) Gloves are to be worn during all phlebotomies .Gloves are changed for every 10 patients' phlebotomy, and also in case of any sample spillage over gloves, obvious skin infections in the patient or if the gloves are damaged. After each patient sample collection, worn gloves are cleaned by rubbing with chlorhexidine gluconate hand washing product (recommended by Hospital Infection Control Committee). Palpation of phlebotomy site may be performed without gloves providing the skin is not broken.
4) A lab coat or gown must be worn during blood collection procedures.
5) Needles and hubs are single use and are disposed of in an appropriate 'sharps' container as one unit. Needles are never recapped, removed, broken, or bent after phlebotomy procedure.
6) All items used for the procedure must be disposed of according to proper biohazardous waste disposal policy.
7) Contaminated surfaces must be cleaned with freshly prepared 1% hypochlorite solution. All surfaces are cleaned daily with bleach.
8) In the case of an accidental needle stick, immediately wash the area with an antibacterial soap, express blood from the wound, and contact your supervisor.

3.3.3. PROCEDURE FOR VENIPUNCTURE:

1) Identify the patient. Outpatients are called into the phlebotomy area and asked their name, and age. . This information must match the requisition. Inpatients are identified by their arm band. If it has been removed, a nurse must install a new one before the patient can be drawn.
2) Reassure the patient that the minimum amount of blood required for testing will be drawn.
3) Assemble the necessary equipment appropriate to the patient's physical characteristics.
4) Wash hands and put on gloves.
5) Position the patient with the arm extended to form a straight-line form shoulder to wrist.
6) Do not attempt a venipuncture more than twice. Notify your supervisor or patient's physician if unsuccessful.
7) Select the appropriate vein for venipuncture. The larger median cubital, basilar and cephalic veins are most frequently used, but other may be necessary and will become more prominent if the patient closes his fist tightly.

3.3.4. Factors to consider in site selection:

- Extensive scarring or healed burn areas should be avoided
- Specimens should not be obtained from the arm on the same side as a mastectomy.
- Avoid areas of hematoma.
- If an IV is in place, samples may be obtained below but NEVER above the IV site.

- Do not obtain specimens from an arm having a cannula, fistula, or vascular graft.
- Allow 10-15 minutes after a transfusion is completed before obtaining a blood sample.

3.3.5. Apply the tourniquet 3-4 inches above the collection site. Never leave the tourniquet on for over 1 minute. If a tourniquet is used for preliminary vein selection, release it and reapply after two minutes.

Clean the puncture site by making a smooth circular pass over the site with the 70% alcohol pad, moving in an outward spiral from the zone of penetration. Allow the skin to dry before proceeding. Do not touch the puncture site after cleaning.

3.3.6. Perform the venipuncture as follows ----------

1) Attach the appropriate needle to the hub by removing the plastic cap over the small end of the needle and inserting into the hub, twisting it tight.
2) Remove plastic cap over needle and hold bevel up.
3) Pull the skin tight with your thumb or index finger just below the puncture site.
4) Holding the needle in line with the vein, use a quick, small thrust to penetrate the skin and enter the vein in one smooth motion.
5) Holding the hub securely, insert the first vacutainer tube following proper order of draw into the large end of the hub penetrating the stopper. Blood should flow into the evacuated tube.
6) After blood starts to flow, release the tourniquet and ask the patient to open his or her hand.

7) When blood flow stops, remove the tube by holding the hub securely and pulling the tube off the needle. If multiple tubes are needed, the **proper order of draw** to avoid cross contamination and erroneous results is as follows:

Closure color	**Collection Tube / Vacuum Tube**	**Investigations**	**Mix by inverting**
Light Yellow	Blood Culture-SPS	Blood Culture	8-10 times
Light Blue	Citrate Tube	Coagulation Parameters	3-4 times
Dark Yellow	SST-Gel separating Tube	Serum analyte measurement	5 times
Red	Serum Tube	Serum analyte measurement	5 times
Dark Green	Heparin Tube	Plasma analyte measurement	8-10 times
Lavender	EDTA Tube	Plasma analyte measurement	8-10 times
Grey	Fluoride Tube	Plasma analyte measurement	8-10 times

8) Each coagulation tube (light blue top) should be gently inverted 4 times after being removed from the hub. Red and gold tops should be inverted 5 times. All other tubes containing an additive should be gently inverted 8-10 times. **DO NOT SHAKE OR MIX VIGOROUSLY.**
9) Place a gauze pad over the puncture site and remove the needle.

10) Immediately apply slight pressure. Ask the patient to apply pressure for at least 2 minutes.

11) When bleeding stops, apply a fresh bandage, gauze or tap

12) Properly dispose of hub with needle attached into a sharps container. Label all tubes with patient labels, initials, date and time.

3.3.7. Infant/Child Phlebotomy

Choice of procedure and site:

The choice of site and procedure (venous site, finger-prick or heel-prick – also referred to as "capillary sampling" or "skin puncture") will depend on the volume of blood needed for the procedure and the type of laboratory test to be done. Venepuncture is the method of choice for blood sampling in term neonates; however, it requires an experienced and trained phlebotomist. If a trained phlebotomist is not available, the physician may need to draw the specimen. The blood from a capillary specimen is similar to an arterial specimen in oxygen content, and is suitable for only a limited number of tests because of its higher likelihood of contamination with skin flora and smaller total volume.

Finger and heel-prick : Whether to select a finger-prick or a heel-prick will depend on the age and weight of the child. Patient immobilization is crucial to the safety of the paediatric and neonatal patient undergoing phlebotomy, and to the success of the procedure. A helper is essential for properly immobilizing the patient for venepuncture or finger-prick.

Venipuncture is the preferred method of blood sampling for term neonates, and causes less pain than heel-pricks

Equipment and supplies for paediatric patients.

- Use a winged steel needle, preferably 23 or 23 gauge, with an extension tube (a butterfly) ;

  avoid gauges of 25 or more because these may be associated with an increased risk of haemolysis;

  use a butterfly with either a syringe or an evacuated tube with an adaptor; a butterfly can provide easier access and movement, but movement of the attached syringe may make it difficult to draw blood.

- Use a syringe with a barrel volume of 1–5 ml, depending on collection needs; the vacuum produced by drawing using a larger syringe will often collapse the vein.

- When using an evacuated tube, choose one that collects a small volume (1 ml or 5 ml) and has a low vacuum; this helps to avoid collapse of the vein and may decrease haemolysis.

Preparation :

Ask whether the parent would like to help by holding the child. If the parent wishes to help, provide full instructions on how and where to hold the child; if the parent prefers not to help, ask for assistance from another phlebotomist.

Immobilize the child as described below.

- Designate one phlebotomist as the technician, and another phlebotomist or a parent to immobilize the child.

- Ask the two adults to stand on opposite sides of an examination table.

- Ask the immobilizer to:

  stretch an arm across the table and place the child on its back, with its head on top of the outstretched arm;
  pull the child close, as if the person were cradling the child; grasp the child's elbow in the outstretched hand;

  use their other arm to reach across the child and grasp its wrist in a palm-up position (reaching across the child anchors the child's shoulder, and thus prevents twisting or rocking movements; also, a firm grasp on the wrist effectively provides the phlebotomist with a “tourniquet”).

- Once the infant or child is immobilized, puncture the skin 3–5 mm distal to (i.e. away from) the vein; this allows good access without pushing the vein away.

- If the needle enters alongside the vein rather than into it, withdraw the needle slightly without removing it completely, and angle it into the vessel.

- Draw blood slowly and steadily.

Conditions influencing the choice of heel or finger-prick:

Condition	Heel-Prick	Finger-Prick
Age	Birth to about 6 months	Over 6 months
Weight	From 3–10 kg, approximately	Greater than 10 kg
Placement of Lancet	On the medial or lateral plantar surface	On the side of the ball of the finger perpendicular to the lines of the fingerprint
Recommended Finger	Not applicable	Second and third finger (i.e. middle and ring finger); avoid the thumb and index finger because of calluses, and avoid the little finger because the tissue is thin

- Using the guidance given in the table,, decide whether to use a finger or heel-prick, and decide on an appropriate size of lancet.
- DO NOT use a surgical blade to perform a skin puncture.
- DO NOT puncture the skin more than once with the same lancet, or use a single puncture site more than once, because this can lead to bacterial contamination and infection.

Prepare the skin :

- Prepare the skin as described above for adult patients.
- DO NOT use povidone iodine for a capillary skin puncture in paediatric and neonatal patients; instead, use alcohol, as stated in the instructions for adults.

Puncture the skin:

- Puncture the skin as described above for adult patients.
- If necessary, take the following steps to improve the ease of obtaining blood by finger-prick in paediatric and neonatal patients:

  ask the parent to rhythmically tighten and release the child's wrist, to ensure that there is sufficient flow of blood;
  keep the child warm by removing as few clothes as possible, swaddling an infant in a blanket, and having a mother or caregiver hold an infant, leaving only the extremity of the site of capillary sampling exposed.
- Avoid excessive massaging or squeezing of fingers because this will cause haemolysis and impede blood flow.

Give follow-up care :

There are two separate steps to patient follow-up care – data entry (i.e. completion of requisitions), and provision of comfort and reassurance.

Note for Phlebotomists :

3.3.8. Please see the below example for explaining the phlebotomy procedure to a patient

Explaining the procedure to a patient

Introduction : Hello, I am _____ I work in this hospital.

What is your name? (phlebotomist checks first and last name against order for tests and the patient's name band if present).

I am trained to take blood for laboratory tests (or medical reasons) and I have experience in taking blood.

I will introduce a small needle into your vein and gently draw some blood for _____ tests. (Tell the patient the specific tests to be done).

Then I will label them with your name and contact details and send them off for tests to the laboratory. The results will be returned to Dr _____ (in case of inpatients, mention the name of the clinician who ordered the tests) / The results will be made available to your after ----------time (turnaround time), and you need to produce the bill while receiving the reports.

Do you have any questions? Did you understand what I explained to you? Are you willing to be tested?

Please sit down and make yourself comfortable . Now, I will ask you a few questions so that both of us feel comfortable about the procedure.

- Have you ever had blood taken before?
- (If yes) How did it feel? How long ago was that?

- Are you scared of needles?
- Are you allergic to anything? (Ask specifically about latex, povidone iodine, tape.)
- Have you ever fainted when your blood was drawn?
- Have you eaten or drunk anything in the past two hours?
- How are you feeling at the moment? **Shall we start?** If you feel unwell or uncomfortable, please let me know at once.

3.4. Collection of Blood Sample from Central Line (Central Venous Catheter , CVC blood Collection)

3.4.1. Indications for CVC blood collection :

CVCs should not be routinely accessed for blood collection. In most cases it is preferable to obtain blood samples from a peripheral vein. If it is known that a venipuncture for blood specimen collection is difficult or not possible, a CVC may be used. Practitioners need to be aware that some CVC blood results (eg. drug levels, electrolytes, coagulation studies) may be altered depending on the intravenous infusion or locking solution infused in the CVC. Careful attention to the technique of obtaining blood from the CVC must be observed. If laboratory values appear inaccurate, redraw a blood sample from a peripheral vein. Requisitions and tubes should be labeled "line draw", which will assist to informing clinicians to use caution when interpreting results.

3.4.2.Procedure :

1) Check patient care orders for lab tests required. Ensure the order of draw, number of times specimen tube needs inversion, and the technical factors (eg. patient fasting, specimen on ice, timeliness of dispatch to laboratory) are known and followed prior to obtaining specimen.

2) Perform hand hygiene.

3) Assemble equipment.

4) Identify patient using two identifiers and explain procedure.

5) If continuous infusion of IV fluids in any lumen STOP all IV solutions for 1-3 minutes prior to draw.

6) Perform hand hygiene. Apply protective gloves.

7) Disconnect the tubing from the injection cap.

8) Scrub the Hub with alcohol alcohol pad for 30 seconds seconds (twist back and forth). Completely air dry 30 seconds.

9) Attach prefilled normal saline syringe into injection cap. • Slowly flush saline into catheter catheter using turbulent (push/pause) flushing method

10) After flushing the catheter, withdraw fluid until blood is visualized in the syringe. Slowly withdraw an additional 2ml (minimum waste) and discard.

• Exceptions for NICU patients: Withdraw 1-2 ml of blood if needed, return to patient according to unit procedure.

11) Connect the vacutainer sleeve onto the injection cap.

12) Attach Vacutainer tubes and fill with blood.

13) Follow the order of tubes for multi- specimen draw.

14) Mix the samples by inversion of vacuum tubes.

15) Follow the labeling and transport instructions as already explained for venipuncture.

16) Flush the line using a push/pause flushing method. Wash out any infusate or blood from the catheter.

17) Repeat if necessary to clear all remaining blood from the catheter. Maintain positive pressure, clamp the tubing and disconnect the syringe . Restart the infusion.

3.5. TROUBLESHOOTING HINTS FOR BLOOD COLLECTION:

If a blood sample is not attainable:

- Reposition the needle.
- Ensure that the collection tube is completely pushed onto the back of the needle in the hub.
- Use another tube as vacuum may have been lost.
- Loosen the tourniquet.
- Probing is not recommended. In most cases, another puncture in a site below the first site is advised.
- A patient should never be stuck more than twice unsuccessfully by a phlebotomist. The Supervisor should be called to assess the patient.

3.6. Collection of Arterial Blood :

Sites : Preferred Radial artery. Alternate sites are brachial artery or femoral artery.

Alternate sites have disadvantages: may be harder to locate, because they are less superficial than the radial artery; have poor collateral circulation; are surrounded by structures that could be damaged by faulty technique.

Inappropriate collection and handling of arterial blood specimens can produce incorrect results. Reasons for an inaccurate blood result include: presence of air in the sample; collection of venous rather than arterial blood; • an improper quantity of heparin in the syringe, or improper mixing after blood is drawn; a delay in specimen transportation.

Equipment and supplies :

Assemble the relevant items (as for venipuncture); plus the following specimen collection equipment and supplies:

• pre-heparinized syringe;

• needles (20, 23 and 25 gauge, of different lengths) – choose a size that is appropriate for the site (smaller gauges are more likely to lyse the specimen);

• a bandage to cover the puncture site after collection;

• a container with crushed ice for transportation of the sample to the laboratory (if the analysis is not done at the point of care);

• where applicable, local anesthetic and an additional single-use sterile syringe and needle.

Procedure for arterial blood sampling using radial artery :

For sampling from the radial artery using a needle and syringe, follow the steps outlined below.

1. Approach the patient, introduce yourself and identify the patient properly.

2. Place the patient on their back, lying flat. Ask the nurse for assistance if the patient's position needs to be altered to make them more comfortable. If the patient is clenching their fist, holding their breath or crying, this can change breathing and thus alter the test result.

3. Locate the radial artery by performing an Allen test for collateral circulation. If the initial test fails to locate the radial artery, repeat the test on the other hand. (A modified Allen test measures arterial competency, and should be performed before taking an arterial sample. Instruct the patient to clench his or her fist; if the patient is unable to do this, close the person's hand tightly. Using your fingers, apply occlusive pressure to both the ulnar and radial arteries, to obstruct blood flow to the hand. While applying occlusive pressure to both arteries, have the patient relax his or her hand, and check whether the palm and fingers have blanched. If this is not the case, you have not completely occluded the arteries with your fingers) . Once a site is identified, note anatomic landmarks to be able to find the site again. If it will be necessary to palpate the site again, put on sterile gloves.

4. Perform hand hygiene, clear off a bedside work area and prepare supplies. Put on an impervious gown or apron, and face protection, if exposure to blood is anticipated.

5. Disinfect the sampling site on the patient with 70% alcohol and allow it to dry.

6. If the needle and syringe are not preassembled, assemble the needle and heparinized syringe and pull the syringe plunger to the required fill level recommended by the local laboratory.

7. Holding the syringe and needle like a dart, use the index finger to locate the pulse again, inform the patient that the skin is about to be pierced then insert the needle at a 45 degree angle, approximately 1 cm distal to (i.e. away from) the index finger, to avoid contaminating the area where the needle enters the skin.

8. Advance the needle into the radial artery until a blood flashback appears, then allow the syringe to fill to the appropriate level. DO NOT pull back the syringe plunger.

9. Withdraw the needle and syringe; place a clean, dry piece of gauze or cotton wool over the site and have the patient or an assistant apply firm pressure for sufficient time to stop the bleeding. Check whether bleeding has stopped after 2–3 minutes. Five minutes or more may be needed for patients who have high blood pressure or a bleeding disorder, or are taking anticoagulants.

10. Remove the needle; remove air bubble if any by pressing the plunger of syringe.

11. put the black cap. Mix the blood by gentle inversion 6-8 times.

12. Label the syringe ; Place the syringe in an ice box, and send to the lab immediately. Do not send the syringe with needle to the lab; remove the needle and put the black cap while sending. No need of bending the needle . Do not put any other cap /rubber cork, etc.. to the syringe end. Use only the black cap provided with the syringe.

13. Dispose appropriately of all used material and personal protective equipment. . Remove gloves and wash hands thoroughly with soap and water, then dry using single-use towels; alternatively, use alcohol rub solution.

14. Check the patient site for bleeding. If required, use additional pressure for stopping bleeding.

3.7. INTERFERING FACTORS:

Reasons for deviations may include-

1. Incorrect specimen collection, handling, storage or labeling.

2. Wrong preservatives or lack of preservatives.

3. Delayed specimen delivery.

4. Incorrect or incomplete patient preparation

5. Hemolyzed blood samples

6. Incomplete sample collection, especially of timed samples.

7. Old or deteriorating specimens

8. Incorrect pretest diet

9. Current drug therapy

10. Type of illness

11. Dehydration

12. Position /activity at time of specimen collection

13. Postprandial status

14. Time of the day

15. Pregnancy

16. No adherence or noncompliance with instructions and pretest preparation

17. Age and gender.

18. Undisclosed drug or alcohol use.

3.8. CSF COLLECTION PROCEDURE:

- Place the patient in a side-lying position with the head flexed onto the chest and knees drawn up to, but not compressing, the abdomen to allow bending the back. This position helps to increase the space between the lower lumbar vertebrae so that the spinal needle can be inserted more easily between the spinal processes. However, a sitting position with the head flexed to the chest can be used. The patient is helped to relax and instructed to breathe slowly and deeply with his or her mouth open.
- Select the puncture site, usually between L4 and L5 or lower. There is a small bony landmark at the L5-S1 interspace known as the surgeon's delight.□ that helps to locate the puncture site. The site is thoroughly cleansed with an antiseptic solution, and the surrounding area is draped with sterile towels in such a way that the drapes do not obscure important landmarks.
- Inject a local anaesthetic slowly into the dermis around the intended puncture site.
- Insert a spinal needle with stylet into the midline between the spines of the lumbar space and slowly advance until it enters the subarachnoid space. The patient may feel the entry as a pop of the needle through the Dura mater. Once this happens, the patient can be helped to straighten his or her legs slowly to relieve abdominal compression.
- Remove the stylet with the needle remaining in the subarachnoid space, and attach a pressure manometer to the needle to record the opening CSF pressure.
- Remove a specimen consisting of up to 20 mL CSF. Take up to four samples of 2 to 3 mL each, place in separate sterile vials, and label sequentially. Tube 1 is used for chemistry and serology; tube 2 is used for microbiology studies; tube 3 is used for haematology cell counts; and tube 4 is used for special studies such as cryptococcal antigens, syphilis testing

(Venereal Disease Research Laboratory [VDRL]), protein electrophoresis, and other immunologic studies. A closing pressure reading may be taken before the needle is withdrawn. In cases of increased ICP, no more than 2 mL is withdrawn because of the risk that the brainstem may shift.

- Apply a small sterile dressing to the puncture site.
- Label tubes correctly with the proper sequential number (1, 2, 3, or 4), the patient's name, and the date of collection. Specimens of CSF must be immediately delivered to the laboratory, where they should be given to laboratory personnel with specific instructions regarding the testing. CSF samples should never be placed in the refrigerator because refrigeration alters the results of bacteriologic and fungal studies. Analysis should be started immediately. If viral studies are to be done, a portion of the specimen should be frozen.
- Record procedure start and completion times, patient's status, CSF appearance, and CSF pressure readings.

Procedural Alert : If the opening pressure is more than 200 mm H_2O in a relaxed patient, no more than 2 mL of CSF should be withdrawn.

- If the initial pressure is normal, Queckenstedt's test may be done. (This test is not done if a CNS tumor is suspected.) In this test, pressure is placed on both jugular veins to occlude them temporarily and to produce an acute rise in CSF pressure. Normally, pressure rapidly returns to average levels after jugular vein occlusion is removed. Total or partial spinal fluid blockage is diagnosed if the lumbar pressure fails to rise when both jugular veins are compressed or if the pressure requires more than 20 seconds to fall after compression is released.

Pre-test Patient Care : Explain the purpose, benefits, and risks of lumbar puncture and explain tests to be performed on the CSF specimen; present a step-by-step description of the actual procedure. Emphasize the need for patient cooperation. Assess for contraindications or impediments such as arthritis. Sedation or analgesia may be used.

- Help the patient to relax by having him or her breathe slowly and deeply. The patient must refrain from breath holding, straining, moving, and talking during the procedure.
- Follow guidelines in Chapter 1 regarding safe, effective, informed pre-test care.

Post test Patient Care : Have the patient lie prone (flat or horizontal, or on the abdomen) for approximately 4 to 8 hours. Turning from side to side is permitted as long as the body is kept in a horizontal position.

- Women may have difficulty voiding in this position. The use of a fracture bedpan may help.
- Fluids are encouraged to help prevent or relieve headache, which is a possible result of lumbar puncture.
- Interpret test outcomes. Assess and monitor for abnormal outcomes and complications such as paralysis (or progression of paralysis, as with spinal tumor), hematoma, meningitis,
- Asphyxiation of infants due to tracheal obstruction from pushing the head forward, and infection. Initiate infection control precautions if test outcomes reveal an infectious process.
- Observe for neurologic changes such as altered level of consciousness, change of pupils, change in temperature, increased blood pressure, irritability, and numbness and tingling sensations, especially in the lower extremities.
- If headache occurs, administer analgesics as ordered and encourage a longer period of prone bed rest. If headache persists, a blood patch may need to be done, in which a small amount of the patient's own blood is introduced into

the spinal canal at the same level that the canal was previously entered. For reasons not totally understood, this blood patch very effectively stops spinal headaches within a very short period.

- Check the puncture site for leakage.
- Document the procedure completion and any problems encountered or complaints voiced by the patient.

Clinical Alert

- Extreme caution should be used when performing lumbar puncture:
- If ICP is elevated, especially in the presence of papilledema or split cranial sutures. However, with some cases of increased ICP, such as with a coma, intracranial bleeding, or suspected meningitis, the need to establish a diagnosis is absolutely essential and outweighs the risks of the procedure.
- A relative contraindication would be ICP from a suspected mass lesion. To reduce the risk for brain herniation, a less invasive procedure such as a CT scan or magnetic resonance imaging (MRI) should be done.

Contraindications to lumbar puncture include the following conditions:

- Suspected epidural infection
- Infection or severe dermatologic disease in the lumbar area, which may be introduced into the spinal canal
- Severe psychiatric or neurotic problems
- Chronic back pain
- Anatomic malformations, scarring in puncture site areas, or previous spinal surgery at the site

- If there is CSF leakage at the puncture site, notify the physician immediately and document findings.
- Finger prick collection procedure
- When whole blood glucose values are not equivalent to plasma values, plasma values are about 10% to 15% higher than whole blood values. However, some of the newer meters now convert the whole blood values to plasma equivalent values, thus giving a better comparison between the lab values and bedside or home testing.

3.9. PATIENT CHECKLIST FOR SELF-MONITORING OF BLOOD GLUCOSE (SMBG) TESTING:

- This list is a general outline. Each brand of meter has its own instructions. Read the instructions on each new meter carefully to get accurate results. Know whether the monitor and strips give whole blood or plasma equivalent results.
- General instructions

    - Make sure hands are clean, dry, and warm.
    - Prick finger with the lancet.
    - Squeeze out a drop of capillary blood.
    - Drop the blood onto the test strip or sensor.
    - Wait for the test strip or sensor to develop.
    - Compare the test strip to the chart or insert it in the meter.
    - Safely dispose of lancet in an approved sharps container.
    - Record blood glucose results with date and time.

- If type 1 diabetes mellitus is present, also monitor urine for ketones for possible dangerous complications such as diabetic ketoacidosis (e.g., during stress or acute illness).
- Test more often on days when illness occurs, when blood glucose is too high, when meal or exercise plans changes, when travelling, or if you feel that your blood glucose is low.
- If concerned about getting accurate results, consult with the diabetes educator or contact the manufacturer to ensure proper use of the monitor.
- Several blood glucose meters currently available are approved by the U.S. Food and Drug Administration (FDA), the agency that approves medical devices, for what's called alternate site testing. •
- Alternate sites (other than fingertips) include forearm, bicep area, palm of hand, between fingers, and sometimes the calf.
- Tips for using alternate sites:
- Rub the site to be used to check blood glucose vigorously before pricking skin. This increases blood flow to the site.
- Use one type of monitor; do not alternate between different monitors. This will help to obtain consistent results. Consistently use the same alternate site. For example, always use forearms. This will also help to obtain consistent results.

Clinical Alert : A recent warning was published by the FDA alerting users of portable glucose monitors to be cognizant of the units of measurement displayed, that is, mg/dL or mmol/L. Reporting a glucose value without reporting the unit of measurement could result in an adverse event.

3.10. ORAL GLUCOSE TOLERANCE TEST

TYPES OF OGTT-

1. Children -2 hours OGTT (fasting sample & post glucose load 2 samples -1 hour, 2 hour after 1.75gm/kg body weight glucose load).
2. Adults - 2 hours OGTT (fasting sample & post glucose load 2 samples -1 hour, 2 hour after 75 gm glucose load).
3. Pregnant women - 3 hours OGTT (fasting sample & post glucose load 3 samples-1 hour, 2 hour ,3 hour after 100gm glucose load).

Patient Preparation

1. Patient should be in normal carbohydrate diet for last 3 days.
2. For 3 days prior to the test, medications known to affect glucose utilization should be discontinued when possible.
3. Strenuous exercise on the previous day and on same day should be avoided.
4. Patient should be in fasting for 12 hours.
5. Patient should not smoke and drink alcohol on the same day or previous day.
6. Patient should be seated in comfortable position.

Glucose Load : For Adults (Male and Female): 75 gram anhydrous glucose in 250-300 ml of water. (For 2 hour GTT)

Children: 1.75g/kg of body weight not exceeding 75 gram (For 2 hour GTT).

Pregnant women: 100 gram of glucose in 250-300 ml of water (For 3 hour GTT).

Note: Ask the patient to drink glucose solution slowly within period of 5 min to avoid vomiting. If patient vomits, test should NOT be continued, and ask the patient to come again next day.

Sample collection:

FOR 2 HOURS GTT-

- After 10-12 hours of fasting, blood and urine samples are collected in the morning before the glucose load.
- Then glucose load is given orally. Urine and blood sample is collected every hour for 2 hours post glucose load.

FOR 3 HOURS GTT-

- After 10-12 hours of fasting, blood and urine samples are collected in the morning before the glucose load.
- Then glucose load is given orally. Urine and blood sample is collected every hour for 3 hours post glucose load.

3.11. Instructions for collection of Urine (Random/Spot)

I. **Preparation before collecting urine :**

For females: Separate the labia and cleanse the urethral meatus twice with plain soap and water from front, and then rinse with plain water twice. For males: Clean the urine collecting area (penis) after retracting the foreskin. For circumcised males this preparation is not required.

II. **Collection of urine** : The patient should use a sterile, wide-mouthed leak-proof container for urine collection. The container will be provided in the hospital. Urinate the first 10 ml into the toilet. Collect 10 ml voided urine in the container by moving into the stream of urine without halting or restarting the stream. Close and secure the lid of the container to make sure that there is no leakage.

3.12. INSTRUCTIONS FOR 24 HOUR URINE COLLECTION AT HOME (For OP) :

Please collect the 24 hour urine sample as per the instructions given ---

1. For some tests, chemical preservatives may be required. The lab reception staff will provide you the preservative and will give you information on its use.
2. For most of the tests, refrigeration is the best method of preservation.

   How to collect ?

   - The lab staff give you a container (plastic can) for collecting urine at home.
   - The urine collection should start in the morning, and continued till next day morning.
   - Don't collect the first voided urine of morning , on the starting day.

- Start collecting second voided urine till next day for 24 hours . For example, if you have started collecting urine at 8.30 AM , continue collecting urine till next day 8.30 AM.
- If a chemical preservative has to be used, put the preservative first into the container , and then start collecting urine for next 24 hours .
- If the preservation is by refrigeration, then after collection of urine every time, keep the container in the refrigerator.
- The whole urine sample in the container has to be delivered to the lab.

Note :

1. Don't spill any urine collected; Urine sample should be directly voided into the container using a funnel.
2. Return the container and funnel to the lab.
3. It is essential that you use the preservative /always keep the container with urine in the refrigerator during the 24 hour collection.
4. In situations where the patient places the specimen into the container (home collection), the lab staff should hand over the appropriate container to the patient with labeling, after checking identity of the patient.

3.13. 24 Hours Urine Collection for IP : Please collect the 24 hour urine sample as per the instructions given ---

1. For some tests, chemical preservatives may be required. The preservatives can be collected from the lab. and lab staff will give you information on its use.
2. For most of the tests, refrigeration is the best method of preservation.

How to collect ?

- Sterile plastic can indented from the FMMCH stores has to be used for urine collection
- The urine collection should start in the morning, and continued till next day morning.
- Don't collect the first voided urine of morning , on the starting day.
- Start collecting second voided urine till next day for 24 hours . For example, if you have started collecting urine at 8.30 AM , continue collecting urine till next day 8.30 AM.
- If a chemical preservative has to be used, put the preservative first into the container , and then start collecting urine for next 24 hours .
- If the preservation is by refrigeration, then after collection of urine every time, keep the container in the refrigerator.
- Measure the 24 hour urine volume. Send 10 ml of this sample to the lab for analysis; inform the 24 hour volume to the lab.

Note :

Don't spill any urine collected; Urine sample should be directly voided into the container using a funnel.

3.14. **Preservatives for 24 Hour Urine Collection :**

Analyte	**Preservative**
Amylase	Refrigeration
Calcium	10 ml of concentrated HCl
Chloride	Refrigeration
Creatinine	Refrigeration

Magnesium	10 ml of concentrated HCl
Microalbumin	Refrigeration
Protein	Refrigeration
Potassium	Refrigeration
Phosphorus	10 ml of concentrated HCl
Sodium	Refrigeration
Uric Acid	10 ml of 10% NaOH
Urea	Refrigeration

In case of non availability of refrigerator for outpatients at home, 10 grams of boric acid can be used as preservative.

3.15 . INSTRUCTIONS FOR SEMEN COLLECTION

--It is important that the semen sample is collected after a minimum of 72 hours but, not longer than 7 days abstinence from intercourse and masturbation

- **Before Collection :**

  -Urinate Prior to semen collection

  ---Wash the genitals (Penis and testes) with water and soap, and rinse thoroughly

  --Wash hands with soap and water

  --The genitals and surrounding skin should be dried with tissue paper

- **During Collection :**

  ---Keep the container opened, do not touch the inside of the container

  --Obtain the semen sample by Masturbation

  ---- Ejaculate directly into the specimen; collect the entire ejaculate

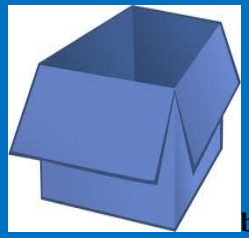
  ----Close the container

- **After Collection :** Hand over the container to sample collection staff.

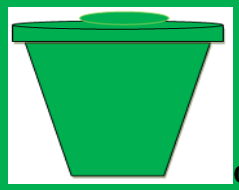
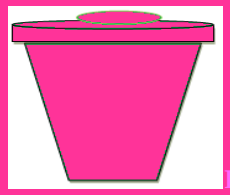
  Note : If you are collecting semen at your house, the sample should be delivered to the lab within 30 minutes. In situations where the patient places the specimen into the container (home collection), the lab staff should hand over the appropriate container to the patient with labeling, after checking identity of the patient.

3.16. Disposal of Biomedical Waste : Waste to be segregated and disposed as per the following guidelines ---

COLOUR CODING AND CONTAINERS	WASTE CATEGORY	TREATMENT AND FINAL DISPOSAL
white puncture proof container	**Sharps** **Needle, guide wires, broken glass pieces, cut ampoules, glass slides, broken blades, scissors, syringes with fixed needles and aluminium foils of vials.**	**Transportation to CTF** **(Disinfect in 1% Sodium hypochlorite solution & disposal through sharp pit)**

yellow	• Human & Animal Anatomical Waste • Microbiology & Laboratory Waste: • Soiled Waste: Non-plastic items like cotton, dressing, bandage, plaster cast, blood bags • Expired Medicines and Cytotoxic Drugs: Containers of Silver nitrates, insecticides, room freshener containers • Chemical Solid Waste	Transportation to CTF (Incinerator and ash disposal through deep burial)
red	Solid (Recycling) Waste Plastic items: IV bottles, syringes, intra venous fluid sets, fluids bags, urine bags, gloves.	Transportation to CTF (Mutilate/ deform before discarding. disinfect in 1% Sodium hypochlorite solution
 blue	Glassware Contaminated glass including medicine vials EXCEPT THOSE CONTAMINATED WITH CYTOTOXIC WASTE.	Transportation to CTF (Recycle)

GENERAL (NON-HAZARDOUS) WASTE

 Green	**Domestic(Wet) Waste** **Left out food particle, vegetable waste, Garbage**	**Transportation to city corporation** **(Bio-gas)**
 Pink	**Stationery (Dry) Waste** **General Paper, Plastic, Cardboard carton**	**Transportation to city corporation** **(Recycle)**

Liquid waste : Liquid waste from Instruments and washing basin/area is treated with 1% hypochlorite and then left out to drainage.

(CTF: Common Treatment Facility-Ramky Agency).

3.17. Monitoring Samples transported from Outside Hospitals/Labs :

The samples transported from outside labs/hospitals are checked for transport conditions, type of containers and matching between request form –container. Following check list is used for the purpose .

Criteria	Yes /No	If No, write your observation /give details
1) Specimen transported under appropriate transport conditions (appropriate to the tests requested)		
2) Specimen container is not leaking		
3) Proper specimen container is used		
4) Specimen is properly labelled with the patient identifiers (atleast name, age, gender)		
5) Test requisition form /requesting letter mentioning the names of tests is provided		
6) Patient identifiers in requisition form and specimen container are matching		

3.18. Sample Rejection Criteria :

In OP sample collection area and Lab Reception Counter, OP/IP samples are rejected based on following criteria :

1) Leaking containers
2) Mismatch of sample container-requisition form /letter
3) Not brought under appropriate transport conditions
4) Wrong containers /vacutainers used
5) Hemolysis (applicable only to OP sample collection area – in case of suspected hemolysis for difficult phlebotomy) : OP sample collection area staff request the user to wait for 15 minutes; centrifuge the sample and find out if there is any hemolysis.

Issue/Rejection Criteria	Action to be taken
No specimen received / No request form provided with specimen	User (sender hospital or lab) to be informed of the event by telephone. Requested to send specimen/request form
inadequate or incorrect patient identifiers in specimen label or in requisition form	User (sender hospital or lab) to be informed of the event by telephone. Requested to send a second specimen.
Specimen unlabelled	User (sender hospital or lab) to be informed of the event by telephone. Requested to send a second specimen.
Mislabelled specimens where there is a major	Specimens will not be processed. This will be recorded on the requisition form.

conflict in any of the mandatory patient identifiers	Sender/user to be informed , and requested to send a second specimen
Time of specimen collection is not indicated in requisition form or specimen label.	The user/sender to be asked to provide specimen collection time. For those tests which should be performed within specific time frame, the test request will be rejected if the specimen collection time is not provided.
Leaking container	Inform the sender/user about the event, and reject the sample.
Specimen not transported under appropriate conditions	Inform the sender/user about the event, and reject the sample
Wrong specimen container used	Inform the sender/user about the event. Verify the possibility of processing the sample (depending on the test). Reject the sample if inevitable.
Evidence of hemolysis (Common causes of hemolysis : Prolonged application of torniquet for more than one minute; drawing blood even before the alcohol/ disinfectant gets dried on the site ; Mixing a tube too vigorously ; underfilling a tube so that the ratio of anticoagulant to blood is greater than 1:9 ; use of a syringe too small a gauge or too large a gauge)	Applicable only to OP sample collection area – in case of suspected hemolysis for difficult phlebotomy : OP sample collection area staff request the user to wait for 15 minutes; centrifuge the sample and find out if there is any hemolysis. The laboratory has to make a decision whether or not the specimen is suitable for testing, depending on the test to be done. Inform the user/sender if the sample is rejected.

If there are repeated rejections of samples sent from a user, such users are informed about the sample collection and transport conditions, and are educated. Sample rejections and actions taken are recorded (FMMCHL/PHL/REG/SRR/41 or FMMCHL/SRC/REG/SRR/41).

3.19. In house Transport of Samples from Inpatient Wards /OP sample collection Area to Lab :

Following guidelines must be followed:

1) Specimen containers must be placed in the appropriate boxes (plastic boxes) provided along with request forms
2) Leaking containers/containers that are externally contaminated should not be sent to the laboratory
3) Under no circumstances should anyone transport specimen in their hands or pockets or in paper carrier bags.

   Transport by Pneumatic Air Tube Systems :

   Pneumatic tube transport system is used for blood samples in vacutainers. It is not used for blood culture bottles, CSF, bone marrow aspiration/biopsy, urine, sputum, saliva and histopathology specimens, sample for blood gas analysis, .

   - Place the vacutainers and requisition forms to be transported in the plastic pouch, and then place the pouch in the carrier container that is provided. Latch the carrier.

- Key in the code of destination address.
- Enter the carrier container into the sending funnel.
- Do not send damaged or contaminated carriers through the system.
- In the receiving destination (Lab sample reception counter) , the carrier falls into a receiver bin. Remove carrier from the bin, unlatch the carrier and remove the contents observing standard precautions.
- Return the carrier to the originator station (sample collection area) using the procedure above.

Transport of samples by manual route:

In FMMCHL, all samples from inpatient wards are transported by manual route (without using pneumatic system). From OP sample collection area, blood culture bottles, CSF, bone marrow aspiration/biopsy, urine, sputum, saliva and histopathology specimens, and samples for blood gas analysis are transported by manual route. Appropriate temperature conditions are maintained as per the details given later for each test. A sample tracking form is maintained for manual transport from OP sample collection area, which is filled and time is recorded at collection area, lab sample reception counter, and receiving lab section . For IP, the ward maids/boys who bring the samples carry book entered with details of samples which keeps track of sample transport.

3.20. Sample Rejection Criteria in FMMCHL & Actions to be taken (Once the sample reaches lab sections) :

Issue/Rejection Criteria	Action by the lab	Action required by the User
No specimen received / No request form provided with specimen	User (ward nursing in charge /sender hospital or lab) will be informed of the event by telephone. Requested to send specimen/request form	. To send specimen /request form.
inadequate or incorrect patient identifiers in specimen label or in requisition form	User (ward nursing in charge /sender hospital or lab) will be informed of the event by telephone. Requested to send a second specimen.	To send a second specimen with requisition form .However, in case of an emergency or difficulty to collect second specimen, the sender may ask for a concession accepting the responsibility (a written request should be collected by the lab).
Specimen unlabelled	User (ward nursing in charge /sender hospital or lab) will be informed of the event by telephone. Requested to send a second specimen.	A second specimen must be collected with a new requisition form
Mislabelled specimens where there is a major conflict in any	Specimens will not be processed. This will be recorded on the requisition form.	A second specimen must be collected with a new requisition form

of the mandatory patient identifiers	Sender/user will be informed , and requested to send a second specimen	
Time of specimen collection us not indicated in requisition form or specimen label.	The user/sender will be asked to provide specimen collection time. For those tests which should be performed within specific time frame, the test request will be rejected if the specimen collection time is not provided.	Provide the specimen collection time or send a second specimen with a new requisition form.
Leaking container	Inform the sender/user about the event, and reject the sample.	To send second specimen
Specimen not transported under appropriate conditions	Inform the sender/user about the event, and reject the sample	To send second specimen
Wrong specimen container used	Inform the sender/user about the event. Verify the possibility of processing the sample (depending on the test). Reject the sample if inevitable.	To send second specimen
Inadequate specimen volume (quantity not sufficient)	The laboratory has to make a decision whether or not the specimen is suitable for testing, depending on the test to be done.	To send second specimen if asked by the lab

	Inform the user/sender if the sample is rejected.	
Evidence of hemolysis	The laboratory has to make a decision whether or not the specimen is suitable for testing, depending on the test to be done. Inform the user/sender if the sample is rejected.	To send second specimen if asked by the lab
Clotted specimen (for those tests requiring plasma or whole blood)	Inform the user/sender about rejection	To send second specimen if asked by the lab
Lipaemic specimen	The laboratory has to make a decision whether or not the specimen is suitable for testing, depending on the test to be done. Inform the user/sender if the sample is rejected.	To send second specimen if asked by the lab
Contaminated urine samples for Culture	Reject the sample and inform the sender/user about rejection	To send a second specimen

3.21. **For sending samples to referral labs** : FMMCHL uses logistic services provided by the referral labs .Whenever, logistic services are not provided, FMMCHL has its own logistics arrangements available and done as per guidelines mentioned for sample transport from outside hospitals/labs.

Outsourcing is done through Lab sample reception counter only. The staff of the counter send the samples after considering the MOU and list of tests, as per review done by lab management. For outsourcing to Pathologists outside, the expertise of pathologist and the clinician's opinion will be considered. It is the responsibility of FMMCHL to arrange for outsourcing.

4. Specific Information On Biochemistry

	SAMPLE COLLECTION AND TRANSPORT AND STORAGE INSTRUCTIONS. **(Storage/Transport conditions:** A : Ambient Temperature; R : Refrigeration; F: Frozen)								
Test Code	**Test**	**Sample**	**Volume of sample to be collected & instruction for collection**	**Precaution /instruction for transport**	**Method of Analysis**	**Processing schedule**	**Turnaround time (TAT)**	**TAT for urgent tests**	**Clinical Utility/ Information on the test**
10621	ABG (Arterial Blood Gas Analysis)	Blood	2 ml. Blood in pre-Heparinised Syringe. Mix gently. Place the black cap to the tip of the syringe. Follow ABG specimen collection instructions.	Transport immediately in ice. Analysis should be done with in 20 min of collection	Potentiometry	24 hours	Same day after 5 min	-----	Metabolic/ Respiratory Alkalosis/Acidosis

10634	ADA	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum)	R	Spectrophoto-metric	24 hours	24 Hours	-----	Diagnosis of tubercular meningitis
10672	ADA	CSF	2 ml CSF (without preservative). Follow CSF specimen collection instructions.	R	Spectrophoto-metric	24 hours	24 hrs	-----	Diagnosis of tubercular effusions
10658 (pericardial fluid); 10659 (ascitic fluid); 10686 (peritoneal	ADA	Other Body Fluids : Ascitic , pleural, peritoneal, pericard	2 ml of Fluid	R	Spectrophoto-metric	24 hours	24 hrs	-----	Diagnosis of Tubercular effusions.

fluid); 10775 (synovial); 10686 (pleural); 10546 (other body fluids)		ial, synovial.							
10691	AFP (Alfa-feto Protein)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours		Mention age, LMP and USG findings or clinical history. Marker of hepatocellular carcinoma and germ cell tumors
10551	A/G Ratio	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Calculation from albumin and globulin values	24 hours	Same day after 2 hours	1 hour	Altered in Liver disease, Renal disease, Malnutrition and Malabsorption

10553	Albumin	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophoto-metric-BCG	24 hours	Same day after 2 hours	1 hour	Used for determining if patient has liver disease or kidney disease.
10660	Albumin	Fluids (Other than CSF & Urine)	2 ml fluid. No preservative	R	Spectrophoto-metric-BCG	24 hours	Same day after 2 hours	1 hour	Used to differentiate Exudate from Transudate (Light's criteriae)
10774	Serum-Ascitic Albumin Gradient	Serum, ascitic fluid	3 ml blood, 2 ml fluid	R	Calculation From serum & ascitic fluid levels of albumin	24 hours	Same day after 2 hours	1 hour	Used to differentiate Exudate from Transudate (Light's criteriae)
10554	Alkaline Phosphatase	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotom etric-PNPP	24 hours	Same day after 2 hours	1 hour	Majority of ALP activity is derived from the liver and bone. Concentrations are increased in patients with biliary

									obstructive disorders, tumor of liver and bone etc.
10618	Ammonia (NH3)	EDTA plasma	2ml Blood in EDTA tube for plasma	Transport immediately in ice. Analysis should be done with in 20 min of collection	Spectrophotometric-kinetic, GLDH	24 hours	Same day after 2 hours	1 hour	Hepatic encephalopathy, Hyperammonemia, Reye's syndrome
10555	Amylase	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric-G7PNP	24 hours	Same day after 2 hours	1 hour	Diagnosis of Pancreatitis
10610	Amylase	Urine 24 hrs	10 ml 24 hrs urine. Quote total volume.	R	Spectrophotometric-G7PNP	24 hours	Same day after 2 hours	-----	Pancreatitis and macroamylassemia
10610	Amylase	Urine Spot	10 ml urine.	R	Spectrophotometric-G7PNP	24 hours	Same day after 2 hours	-----	Pancreatitis and macroamylassemia

10673	Amylase	CSF	2 ml fluid	R	Spectrophotometric-G7PNP	24 hours	Same day after 2 hours	1 hour	TB diagnosis
10675 (pericardial); 10681 (peritoneal); 10661 (ascitic);10687 (pleural); 10776 (synovial).	Amylase	Other body fluids	2 ml fluid	R	Spectrophotometric-G7PNP	24 hours	Same day after 2 hours	-----	Pancreatic ascitis; pancreatic effusions.
10716	Anti TPO	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Autoimmune thyroiditis
10692	ASO	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating	R	Immuno - turbidimetry	24 hours	Same day after 2 hours	1 hour	Exposure to strep. Pyogens.

			tube for serum						
10720	Beta- HCG	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Pregnancy, Ectopic pregnancy, Choriocarcinoma
10556	Bicarbonate	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophoto metric, PEPCK	24 hours	Same day after 1 hours	1 hour	Diagnosis of Acidosis and Alkalosis, Anion Gap.
10635	Bilirubin Direct (Conjugated)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophoto metric -DPD	24 hours	Same day after 2 hours	1 hour	Used for patients who show signs of abnormal liver function.
10637	Bilirubin Indirect (unconjugated)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Calculation from total and direct bilirubin	24 hours	Same day after 2 hours	1 hour	Used for patients who show signs of abnormal liver function., and haemolytic causes of

									jaundice
10559	Bilirubin Total	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophoto metric-DPD	24 hours	Same day after 2 hours	1 hour	Used for patients who show signs of abnormal liver function.
10671 (unconjugated/indirect); 10666 (conjugated/direct); 10662 (total)	Bilirubin : Total, direct and indirect	Body fluids	2 ml fluid	R	Spectrophoto metric-DPD	24 hours	Same day after 2 hours	1 hour	Used for patients who show signs of abnormal liver function.
10626	BNP (Brain Natriuretic Peptide) /Pro-BNP	Whole blood	2ml Blood in EDTA tube for whole blood/ plasma	R. Transport as early as possible to increase the relevance of the report	Dry chemistry-FIA	24 hours	Same day after 1 hours	1 hour	Diagnosis of CHF, Exclusion of acute and non acute heart failure. (As a part of SOB, Cardiac profile, Cardiac Trio)
10630	BUN (Blood	Serum	3 ml Blood in	R	Calculation	24 hours	Same day	1 hour	Kidney function test

	Urea Nitrogen)		Plain tube or 3.5 ml Blood in Gel separating tube for serum		form serum urea level		after 2 hours		
10617	C3 (Complement C3)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Immunoturbidimetric	24 hours	Same day after 2 hours	-----	Glomerulonephritis
10711	CA-19.9	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Pancreatic malignancy
10701	CA-125	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Ovarian cancer marker
10663	CA-125	Serum	2 ml fluid	R	ECLIA	24 hours	Same day after 2 hours	-----	Ovarian cancer marker

10561	Calcium	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric-NM-BAPTA	24 hours	Same day after 2 hours	1 hour	High level in Hyperparathyroidism, Malignancy, Sarcoidosis. Low levels in hypoalbuminemia, renal insufficiency, hypoparathyroidism.
10640	Calcium	Urine 24 hours	10 ml concentrated HCl as preservative for 24 hrs urine. (Quote Total volume).send 10 ml urine to the lab.	R	Spectrophotometric-NM-BAPTA METHOD	24 hours	Same day after 2 hours	-----	Diagnosis of hyper and hypoparathyroi-dism
10615	Calcium	Urine spot	Acidify the urine with concentrated HCl to adjust	R	Spectrophotometric-NM-BAPTA METHOD	24 hours	Same day after 2 hours	1 hour	Diagnosis of hyper and hypoparathyroidism

			pH 3-4. 10 ml urine is required.						
10641	Calcium Creatinine Ratio	Urine Spot	Acidify the urine with concentrated HCl to adjust pH 3-4. 10 ml urine is required.	R	Spectrophotometric-NM-BAPTA METHOD	24 hours	Same day after 2 hours	1 hour	Diagnosis of hyper and hypo parathyroidism
10719	CEA	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Colorectal adenocarcinoma
10664	CEA	Ascitic fluid	2 ml fluid	R	ECLIA	24 hours	Same day after 2 hours	-----	Colorectal adenocarcinoma
10562	Chloride	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating	R	ISE	24 hours	Same day after 2 hours	1 hour	Electrolyte imbalance

			tube for serum						
10652	Chloride	CSF	2 ml fluid (Without any preservative)	R. Transport as early as possible to increase the relevance of the report	ISE	24 hours	Same day after 2 hr.	1 hour	For differential diagnosis of meningitis
10642	Chloride	Urine 24 hrs	10 ml 24 hrs urine. (without any preservative)	R	ISE	24 hours	Same day after 2 hr.	-----	For differential diagnosis of hyperchloremic metabolic acidosis and hypochloremic metabolic alkalosis
10643	Chloride	Urine spot	10 ml spot urine. (without any preservative)	R	ISE	24 hours	Same day after 2 hr.	1 hour	For differential diagnosis of hyperchloremic metabolic acidosis and hypochloremic metabolic alkalosis
10665 (ascitic);	Chloride	Fluids	2 ml body fluid (Without any	R	ISE	24 hours	Same day after 2 hours	-----	Used for differential diagnosis of effusions

10652 (CSF); 10676 (Pericardial); 10682 (Peritoneal); 10688 (Pleural); 10777 (Synovial); 10547(any other fluid)			preservative)						
10579	Cholesterol-HDL (HDL cholesterol)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum (10-12 hrs fasting	R	Spectrophotometric-PEG-CE-CHOD-POD	24 hours	Same day after 2 hours	-----	Risk stratification of IHD

			required)						
10583	Cholesterol-LDL (LDL Cholesterol)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum (10-12 hrs fasting required)	R	Spectrophotometric-PEG-CE-CHOD-POD	24 hours	Same day after 2 hours	-----	Risk stratification of IHD
10563	Cholesterol-Total	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum .(10- 12 hours fasting required)	R	Spectrophotometric, CHOD-POD	24 hours	Same day after 2 hours	-----	Increased levels related to increased risk of cardiovascular disease.
10636	Total cholesterol – HDL cholesterol	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating	R	Calculation from total cholesterol and HDL	24 hours	Same day after 2 hours	-----	Increased levels related to increased risk of cardiovascular disease.

	ratio		tube for serum .(10- 12 hours fasting required)		cholesterol values				
	C peptide	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	----	Diabetes Mellitus, Insulinoma.
10564	CKMB Activity	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum. Avoid collection in plasma tubes.	R. Transport as early as possible to increase the relevance of the report	Immunologic, UV spectrophoto-metric-CK-HK-G6PDH	24 hours	Same day after 2 hours	1 hour	Myocardial Infarction
	CKMB mass	Plasma EDTA	2ml Blood in EDTA tube for plasma	R. Transport as early as possible to increase the	Dry chemistry-FIA	24 hours	Same day after 2 hours	1 hour	Myocardial Infarction

				relevance of the report					
10717(Cortisol, random); 10781 (Morning cortisol); 10782 (Evening Cortisol)	Cortisol	Serum	Sample to be collected at Morning 8 AM, and evening 4 PM. 3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum.	R	ECLIA	24 hours	Same day after 2 hours	-----	Cushing syndrome. Addison's disease and HRT
10565	CPK Activity Total	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophoto-metric-CK-HK-G6PDH	24 hours	Same day after 2 hours	1 hour	Myocardial, Cerebro-vascular, skeletal muscular disease
10566	Creatinine	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating	R	Jaffe's Kinetic	24 hours	Same day after 2 hrs	1 hour	Renal function test

			tube for serum						
10644	Creatinine	Urine 24 hrs	10 ml of 24 hrs urine. No preservative ,Refrigeration needed. If refrigerator is not available, use 10 ml of concentrated HCl or 10 grams boric acid as preservative. Quote total volume.	R	Jaffe's Kinetic	24 hours	Same day after 2 hrs	-----	Renal function test
10614	Creatinine	Spot Urine	10 ml urine	R	Jaffe's Kinetic	24 hours	Same day after 2 hrs	1 hour	Renal function test; also used for calculation of protein : creatinine ration & calcium creatinine

									ratio.
10567	Creatinine Clearance	Serum & Urine	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum & 10 ml 24 hrs urine. (Quote Total volume)	R	Calculation	24 hours	Same day after 2 hrs	-----	Renal function test
10693	CRP	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Immunoturbid-ometric	24 hours	Same day after 2 hours	1 hour	Marker of inflammation
19568	D.N.P.H. Test	Urine	10 ml urine	R	Qualitative test	24 hours	Same day after 2 hr.	-----	Diagnosis of Phenylketonuria & Maple syrup urine disease
10628	D-Dimer	Whole blood	2ml Blood in EDTA tube for whole blood/	R Transport as early as possible to	Dry chemistry-Fluorescent Immunoassay	24 hours	Same day after 1 hours	1 hour	Exclusion of DVT and pulmonary embolism. (As a part

			plasma	increase the relevance of the report					of SOB panel)
10569	Electrolytes (Na, K, Cl)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ISE	24 hours	Same day after 2 hours	1 hour	Useful in assessing acid base balance and electrolyte balance in a variety of medical conditions.
	Electrolytes (Na, K, Cl)	Urine, 24 hours	10 ml 24 hrs Urine (without any preservative)	R	ISE	24 hours	Same day after 2 hours	-----	Useful in assessing acid base balance and electrolyte balance in a variety of medical conditions.
	Electrolytes (Na, K, Cl)	Urine spot	10 ml spot urine	R	ISE	24 hours	Same day after 2 hours	-----	Useful in assessing acid base balance and electrolyte balance in a variety of medical conditions.
	Electrolytes (Na, K, Cl, Mg, Ca,	Dialysis fluid	2 ml dialysis fluid	R	ISE & spectrophoto-metric-PEPCK	24 hours	Same day after 2 hours	-----	Analysis of dialysis fluid; renal function test.

	Bicarbonate, phosphate)								
10593	Electrophoresis - Serum protein	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Cellulose acetate automated electrophoresis	Every Wednesday & Saturday		-----	Diagnosis and management of paraproteinemia, chronic infections, liver cirrhosis, nephrotic syndrome.
10580	Electrophoresis – Hemoglobin	Whole Blood	2ml whole Blood in EDTA tube	R	Agarose gel electrophoresis at alkaline/acidic pH	Every Wednesday & Saturday		-----	Diagnosis of hemoglobinopathies
10570	Ferric Chloride Test	Urine spot	10 ml urine	R	Qualitative test	24 hours		-----	Diagnosis of inborn errors of metabolism
10695	Ferritin	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hrs	-----	Iron deficiency and iron overload
10696	Fertility	Serum	3 ml Blood in	R	ECLIA	24 hours	Same day	-----	Assessment of

	Hormones (LH, FSH, Prolactin)		Plain tube or 3.5 ml Blood in Gel separating tube for serum (Fating 1 hr, 2 hr, 2 hr)				after 2 hrs		infertility
10697	Free T_4	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Thyroid function test
10698	FSH	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Gonadal function test
10573	GGTP (Gamma Glutamyl Transferase))	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric-L-γ-glutamyl-3-carboxy-4-nitroanilide to	24 hours	Same day after 2 hrs	1 hour	Alcoholic liver disease and cholestasis

					glycylglycine Substrate				
10574	Globulin	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Calculation from albumin and total protein	24 hours	Same day after 2 hrs	1 hour	Increased level related to chronic infections, Hepatic diseases, multiple myeloma
10633 (random); 10560(Fasting); 10632 (post prandial)	Glucose (Random, Fasting, Post prandial)	Plasma	2ml Blood in Fluoride tube for plasma (Anytime,10-12 hrs of fasting, 2 hrs after food)	R	Spectrophotometric-HK-G6PD.	24 hours	Same day after 2 hours	1 hour	Diabetes mellitus, impaired glucose tolerance and hypoglycaemic conditions
10656	Glucose	CSF	2 ml Fluid, No preservative	Store in ice. Transport as early as possible to increase the relevance of the report	Spectrophotometric-HK-G6PD.	24 hours	Same day after 1 hours	1 hour	Used for differentiating bacterial meningitis from others

10548	Glucose	Fluids other than CSF and Urine	2 ml Fluid, No preservative	Store in ice	Spectrophotometric-HK-G6PD.	24 hours	Same day after 2 hours	-----	Used for differential diagnosis of effusions
10576	Glucose (Glucometer)	Capillary Blood	Drop of capillary finger prick blood.	R	Spectrophotometric-HK-G6PD.	24 hours	Same day after 15 min.	-----	Quick test for hypoglycaemia and hyperglycemia
10577	Glucose Tolerance Test (GTT)	Plasma & Urine	2ml Blood in Fluoride tube for plasma. 10 ml urine. (FPG,75 g glucose after 30 min, 1 hr, 1.30 hr, 2 hr) (GTT after GCT-FPG, 100 g glucose, 1 hr, 2 hr, 3 hr)	R	Spectrophotometric-HK-G6PD. For glucose estimation	24 hours	Same day after 2 hours of last sample	-----	Diagnosis of Diabetes mellitus, Gestational DM, Renal glycosuria.
10631	Glucose	Plasma	2ml Blood in	R	Spectrophotom	24 hours	Same day	-----	Diagnosis of

	Challenge Test (GCT)		Fluoride tube for plasma. (50 g glucose, after 1 hr)		etric-HK-G6PD.		after 2 hours of last sample		gestational diabetes mellitus
10578	Glycated Hemoglobin (HbA1C)	Whole Blood	2 ml Whole Blood in EDTA tube.	R	Immunoturbidometry	24 hours	Same day after 2 hrs.	-----	Diagnosis and management of diabetes mellitus
	Glycated Hemoglobin (HbA1c)	Whole Blood	2 ml Whole Blood in EDTA tube.	R	HPLC	24hours	Same day after 3 hrs	-------	Diagnosis and management of diabetes mellitus
10718	IgE	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hrs	-----	Eosinophilia, Allergy.
	Insulin (Fasting& Random)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hrs	-----	Diabetes Mellitus, Insulinoma.
10608	IEM Screening	Urine	10 ml spot or	R	Qualitative	8.30 AM to	After 48 hours	-----	Screening tests for

	–Chemical tests & Chromato-graphy for amino aciduria, glycosuria, MPS, Methyl malonic aciduria.		24 hrs urine. preferably 3 consecutive days' samples. No preservatives.		chemical tests and chromatograph y	4.30 PM.			Inborn Errors of Metabolism
10622	Iron	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotom etric-Ferrozine	24 hours	Same day after 2 hours	1 hour	Assessment of Iron deficiency and Iron Overload
10581	K (Potassium)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ISE	24 hours	Same day after 2 hours	1 hour	Differential diagnosis of hypokalemia and hyperkalemia, metabolic acidosis, metabolic alkalosis
10765	K (Potassium)	Urine 24	10 ml 24 hrs	R	ISE	24 hours	Same day	1 hour	Differential diagnosis

		hrs	urine. No preservative. Quote total volume.				after 2 hrs		of hypokalemia and hyperkalemia,
10766	K (Potassium)	Urine Spot	2 ml Urine.	R	ISE	24 hours	Same day after 2 hrs	1 hour	Differential diagnosis of hypokalemia and hyperkalemia,
10619	Lactate	Plasma	2ml Blood in Fluoride tube for plasma.	Transport immediately in ice. Analysis should be done with in 20 min of collection	Spectrophotometric-LDH	24 hours	Same day after 1hrs	1 hour	Liver failure, urea cycle defects and some inborn errors of metabolism
	Lactate	CSF	2 ml Fluid	Store in ice. Transport as early as possible to increase the relevance of	Spectrophotometric-LDH	24 hours	Same day after 1hrs	1 hour	Liver failure, urea cycle defects and some inborn errors of metabolism

				the report					
10582	LDH	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric, Kinetic method (lactate to pyruvate)	24 hours	Same day after 2 hours	1 hour	Marker enzyme for cell turnover, cell destruction; increased in haemolytic diseaseas, liver diseases, etc...
10668 (Ascitic); 10674 (CSF); 10549(Other body fluid); 10678 (Pericardial); 10684 (Peritoneal); 10771 (pleural); 10779	LDH	Body fluids (pleural, peritoneal, pericardial, synovial, ascitic)	2 ml fluid without preservative	R	Spectrophotometric, Kinetic method (lactate to pyruvate)	24 hours	Same day after 2 hours	-----	Differential diagnosis of effusions; marker enzyme for cell turnover and cell destruction.

(Synovial)									
10699	LH	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Gonad dysfunction. Assessment of Infertility.
10584	LFT (total protein, albumin, total bilirubin, direct bilirubin, indirect bilirubin, ALT, AST, ALP)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric methods	24 hours	Same day after 2 hours	1 hour	Liver function assessment
10607	Lipase	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric, Kinetic	24 hours	Same day after 2 hours	1 hour	Diagnosis of pancreatitis
10669 (ascitic);	Lipase	Body fluids	2 ml fluid	R	Spectrophotometric, Kinetic	24 hours	Same day after 2 hours	1 hour	Pancreatic effusions

10772 (pleural)									
10759	Lipid profile (fasting)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric, enzymatic methods for TG, total cholesterol, LDL-Cholesterol, HDL cholesterol; calculation of VLDL and Choelsterol-HDL ratio	24 hours	Same day after 2 hours	-----	Hypolipidemia and Hyperlipidemia.
10585	Lithium	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ISE	24 hours	Same day after 1hrs	-----	Assessment of Manic Depressive illness, therapeutic drug monitoring, Lithium toxicity
10586	Magnesium	Serum	3 ml Blood in	R	Spectrophotom	24 hours	Same day	1 hour	Assessment of hypo

			Plain tube or 3.5 ml Blood in Gel separating tube for serum		etric-CPZ III.		after 2 hours		& hypermagnesemia
10645	Magnesium	Urine 24 hrs	Preservative: 10 ml of concentrated HCl for 24 hrs urine . Quote 24 hrs volume; send 10 ml urine to lab.	R	Spectrophotom etric-CPZ III. .(1:5 dilution)	24 hours	Same day after 2 hours	-----	Assessment of hypo & hypermagnesemia.
10646	Magnesium	Urine spot	10 ml urine Acidify with conc. HCl after collection. Ph < 1.	R	Spectrophotom etric-CPZ III. .(1:5 dilution)	24 hours	Same day after 2 hours	-----	Assessment of hypo & hypermagnesemia.
	Micro Albumin	CSF	2 ml fluid. No preservative.	R. Transport as early as possible to increase the	Immunoturbido metric	24 hours	Same day after 2 hours	-----	Diagnosis of Nephropathy

				relevance of the report					
10647	Micro Albumin	Urine, 24 hours	10 ml 24 hours urine. No preservative (Quote 24 hours volume)	R	Immunoturbidometric	24 hours	Same day after 2 hours	-----	Diagnosis of Nephropathy
10648	Micro Albumin	Urine spot	10 ml spot urine	R	Immunoturbidometric	24 hours	Same day after 2 hours	----	Diagnosis of Nephropathy
10655	Micro TP (CSF Protein)	CSF	2 ml fluid, No preservative	R. Transport as early as possible to increase the relevance of the report	Turbidometric-Benzaalkonium Chloride	24 hours	Same day after 2 hours	-----	Differential diagnosis of meningitis
	Micro TP (Urine protein)	Urine 24 hours	10 ml 24 hrs Urine. No preservative. Quote Total volume	R	Turbidometric-Benzaalkonium Chloride	24 hours	Same day after 2 hours	-----	Diagnosis and management of diabetic nephropathy and chronic renal failure
10769	Micro TP	Urine	10 ml spot	R	Turbidometric-	24 hours	Same day	-----	Diagnosis and

	(Urine protein)	spot	urine		Benzaalkonium Chloride		after 2 hours		management of diabetic nephropathy and chronic renal failure
10767	Protein creatinine ratio	Urine spot	10 ml spot urine	R	Calculation from protein and creatinine	24 hours	Same day after 2 hours	-----	Diagnosis and management of diabetic nephropathy and chronic renal failure
	Methotrexate	serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Enzyme immunoassay	24 hours	Same day after 2 hours	-----	Leukemia, Osteosarcoma.
10609	MPS	Urine	10 ml 24 hrs urine	R	CPC turbidity test & O-toluidine blue test; qualitative	24 hours	After 24 hrs	-----	Diagnosis of Mucopolysaccharidoses
	Myoglobin	Whole blood	2ml Blood in EDTA tube for whole	R. Transport as early as possible to	Dry Chemistry-FIA	24 hours	Same day after 1 hours	1 hour	Diagnosis of MI (As a part of Cardiac panel, Cardiac

			blood/plasma. (Alere Triage)	increase the relevance of the report					profiler, SOB panel)
10588	Na (Sodium)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ISE	24 hours	Same day after 2 hours	1 hour	Analysis of Hyper or Hyponatraemia
10768	Na (Sodium)	Urine 24 hrs	10 ml 24 hrs urine. No preservative. Quote the total volume.	R	ISE	24 hours	Same day after 2 hours	-----	Analysis of Hyper or Hyponatraemia
10613	Na (Sodium)	Urine Spot	2 ml urine	R	ISE	24 hours	Same day after 2 hours	1 hour	Analysis of Hyper or Hyponatraemia
10589	Osmolality	Serum	2ml Blood in Fluoride tube for plasma & 3 ml Blood in Plain tube or 3.5 ml Blood in	R	Depression in freezing point-Osmometer	24 hours	Same day after 2hrs	1 hour	Used in investigation of hyponatraemia and identification of an osmolar gap

			Gel separating tube for serum						
10649	Osmolality	Urine	Urine spot without preservatives, 10 ml.	R	Depression in freezing point-Osmometer	24 hours	Same day after 2 hours	1 hour	Used in investigation of hyponatraemia and identification of an osmolar gap
10714	Parathyroid Hormone (PTH)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	1 hour	Diagnosis of Hypoparathyroidism, Hyperparathyroidism
10590	Phosphorous	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	UV-Spectrophotometric-Molybdate	24 hours	Same day after 2 hours	1 hour	Renal failure, Hypo & Hyperparathyroidism, rickets.
10750	Phosphorous	Urine 24 hrs	10 ml of concentrated HCl to acidify 24 hours urine. Quote 24 hours	R	UV-Spectrophotometric-Molybdate	24 hours	Same day after 2 hours	-----	Renal failure, Hypo & Hyperparathyroidsm

			volume; send 10 ml urine to the lab						
10616	Phosphorous	Urine spot	2 ml urine. Acidify with HCl after collection. Ph 3-4.	R	UV-Spectrophotometric-Molybdate	24 hours	Same day after 2 hours	-----	Renal failure, Hypo & Hyperparathyroidsm
10702	Prolactin	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum , collect at rest before 12 noon Fasting sample 1hr and 2hrs after breakfast	R	ECLIA	24 hours	Same day after 2 hours	-----	Pituitary tumors, menstrual irregularities, infertility, impotence and galactorrhea.
10703	Prostate Specific Antigen	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in	R	ECLIA	24 hours	Same day after 2 hours	-----	For Benign prostatic hypertrophy, prostate cancer. Avoid test for

	(P.S.A), total		Gel separating tube for serum						7 days after PR examination, USG, UTI.
10592	Protein	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Biuret	24 hours	Same day after 2 hours	1 hour	Useful in evaluating patient's nutritional status, liver disease, renal disease and GI disease.
10670 (ascitic); 10550 (other fluids);10679 (pericardial);10685 (peritoneal); 10773 (Pleural); 10780 (Synovial)	Protein	Fluids (Other than CSF & Urine)-perioteneal, pleural, ascitic, synovial.	2 ml fluid. No preservative.	R	Biuret	24 hours	Same day after 2 hours	-----	Levels increased in inflammatory, neoplastic or traumatic conditions

10704	RF (RA) Test	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Immunoturbidometry	24 hours	Same day after 2 hours	1 hour	For diagnosis of rheumatoid arthritis
	SOB panel (Troponin-I, CKMB, Myoglobin, BNP, D-Dimer)	Whole blood	2ml Blood in EDTA tube for whole blood	R Transport as early as possible to increase the relevance of the report	Dry Chemistry-FIA	24 hours	Same day after 1 hours	1 hour	Cardiac function
10594	SGOT/AST	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric-AST-MDH-NAD	24 hours	Same day after 2 hours	1 hour	Analysis of Liver function
10595	SGPT/ALT	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric-ALT-LDH-NAD	24 hours	Same day after 2 hours	1 hour	Analysis of Liver function

10705	T3	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Thyroid function tets
10706	T4	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Thyroid function test
10708	Thyroid Function Test (T3,T4,TSH,FT4)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Thyroid function assessment
10710	TSH	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	-----	Thyroid function test
10707	TSH	Cord	3 ml Blood in	R	ECLIA	24 hours	Same day	-----	Thyroid function test

		blood serum	Plain tube or 3.5 ml Blood in Gel separating tube for serum				after 2 hours		
10712	Testosterone	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	------	Precocious puberty, Gonad dysfunction, Hirsutism
10624	Total Iron Binding Capacity	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Calculation : Iron+UIBC	24 hours	Same day after 2 hours	-----	Differential diagnosis of microcytic anemia, Iron toxicity
10602	Triglycerides	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum (10-12 hrs fasting	R	Spectrophotometric-LPL-GK-GPO-POD	24 hours	Same day after 2 hours	-----	High conc. are associated with pancreatitis and increased risk for cardiovascular disease.

			required)						
10596	Troponin I	Whole blood	2 ml Blood in EDTA tube for whole blood/plasma. (Alere Triage)	R. Transport as early as possible to increase the relevance of the report	Dry chemistry-Fluorescent Immunoassay	24 hours	Same day after 1 hours	1 hour	Diagnosis of MI (As a part of Cardiac Panel, Cardio profiler, SOB and Cardio 3 panel)
	Troponin T	Whole blood	2 ml Blood in Heparinised tube for whole blood/plasma (Cobas h 232)	R. Transport as early as possible to increase the relevance of the report	Dry chemistry-Fluorescent Immunoassay	24 hours	Same day after 1 hours	1 hour	Diagnosis of MI
	Cardiac Troponin T	EDTA Blood	2 ml EDTA Blood (Allere diagnostics)	R	Dry chemistry-Fluorescent Immunoassay	Daily 24hrs	Same day after 1 hours	-----	Diagnosis of MI
10624	Unbound Iron Binding Capacity	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric-Ferrozine)	24 hours	Same day after2 hours	------	Iron status

10604	Urea	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Spectrophotometric, Kinetic, Urease-GLDH	24 hours	Same day after 2 hours	1 hour	Kidney function test; Pre renal and post renal conditions of increased blood urea.
10611	Urea	Urine 24 hrs	10 ml 24 hrs Urine. No preservative. Quote total volume.	R	Spectrophotometric, Kinetic, Urease-GLDH	24 hours	Same day after 2 hours	-----	Kidney function test
10611	Urea	Urine spot	2 ml spot urine.	R	Spectrophotometric, Kinetic, Urease-GLDH	24 hours	Same day after 2 hours	-----	Kidney function test
	Urea Clearance	Urine 24 hrs, Plasma	10 ml 24 hrs Urine. No preservative. 2 ml EDTA Plasma.	R	Calculation	24 hours	Same day after 2 hours	------	Kidney function test
10605	Uric Acid	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in	R	Spectrophotometric, Uricase	24 hours	Same day after 2 hours	1 hour	Gout, disorders of purine metabolism. Lesch-Nyhan &

			Gel separating tube for serum						Fabconi syndrome
10770	Uric Acid	Urine 24 hrs	10 ml 24 hrs urine. Do not refrigerate. NaOH to alkalinise urine. Ph > 8. Quote total volume.	R	Spectrophoto metric, Uricase	24 hours	Same day after 2 hours	----	Gout, disorders of purine metabolism. Lesch-Nyhan & Fanconi syndrome.
10612	Uric Acid	Urine spot	2 ml urine. Alkalinise with 10 ml. 10% NaOH. pH should be > 8.	R	Spectrophoto metric, Uricase	24 hours	Same day after 2 hours	-----	Gout, disorders of purine metabolism. Lesch-Nyhan & Fanconi syndrome.
10713	Vitamin B12	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	ECLIA	24 hours	Same day after 2 hours	----	Nutritional and macrocytic anaemia
10783	Vitamin D, 25-	Serum	3 ml Blood in	R	ECLIA	24 hours	Same day	----	To diagnose and

	hydroxy		Plain tube or 3.5 ml Blood in Gel separating tube for serum				after 2 hours.		manage vitamin D deficiency
10557	Serum Anion gap (Na^+,K^+,Cl^- ,HCO_3^-)	Serum	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum	R	Calculation from sodium, potassium, bicarbonate and chloride values	24 hours	Same day after 2 hours.	----	Differential diagnosis of metabolic acidosis
	Urine Anion gap (Na^+,K^+,Cl^-)	Urine 24 hrs	10 ml 24 hrs urine. No preservative. Quote the total volume.	R	Calculation from sodium, potassium and chloride values	24 hours	Same day after 2 hours.	----	Differential diagnosis of metabolic acidosis
10774	Serum Ascitic Albumin Gradient(SAAG)	Serum & Ascitic fluid.	3 ml Blood in Plain tube or 3.5 ml Blood in Gel separating tube for serum & 5 ml of Ascitic fluid.	R	Calculated from serum albumin and ascitic fluid albumin values	24 hours	Same day after 2 hours.	-----	Differential diagnosis of effusions

A : Ambient Temperature; R : Refrigeration; F: Frozen

5.Specific Information on Microbiology

COLLECTION AND TRANSPORT OF CLINICAL SPECIMEN FOR MICROBIOLOGICAL EXAMINATIONS

5.1.. GENERAL INSTRUCTIONS:

- All specimens for culture must be preferably taken before institution of antimicrobial therapy under aseptic precautions.
- Collect adequate amount of the specimen from site where the organisms are most likely to be found and at a stage when the organisms may be found maximally.
- Give clear and correct instructions to the patient for collection of specimens he himself is asked to collect, as for example urine and sputum. Specimens from known HIV & Hepatitis B. positive patients should be sent sealed in double bags with Biohazard label on it.

5.1.1. Sterile Containers:

- All specimens for microbiology should be collected only in sterile containers. Serology samples should be collected in plain vacutainer for serum and EDTA vacuntainer for plasma . Do not fill the containers up to the brim, since overflow or absorption

by plugs or caps may occur. Label completely and legibly. Containers in common uses are listed below, with indication of specimen to be collected.

- Sterile swabs: Pus, infected wounds, throat, nose, vaginal secretions or other site.
- Sterile wide-mouthed containers for C.S.F, body fluid such as ascitic, pleural, synovial fluids.
- Sterile containers, with screw cap and wide mouth for pus, urine, sputum, feces scrapings from any site & biopsies.
- Sterile large wide-mouth screw cap 500 ml bottle for urine for mycobacteria.
  a. For blood culture - Automated: Bactec blood culture system bottles.
  b. For Anaerobic culture: Specimen inoculated immediately into Robertson Cooked Meat (RCM) media.

Note: Outside of containers or laboratory forms should never be soiled with the specimens. In case of contamination by the specimen, it should be cleaned with disinfectants like, Lysol (7%) or spirit (70% ethanol) to prevent transfer of infection to those handling the container. A leaky or over flowing container with specimen should not be accepted. Forms soiled with specimen can be discarded after making a duplicate and informing the section concerned.

5.1.2. Requisition slips

- Clearly fill all the details specified in the requisition form.

5.1.3.Transport of clinical specimens:

- Transport specimens to the laboratory immediately without any delay.

5.2. COLLECTION OF CLINICAL SAMPLES FOR ROUTINE CULTURE

5.2.1. Blood

1. Blood must be drawn under strict aseptic conditions.
2. Prepare the skin with 70% alcohol first and 2% iodine for 2 minutes as for a minor surgical procedure.
3. For Bactec culture: Volume as per instruction on the Bactec culture bottle.
4. For Anaerobic Culture:Inoculate 1.5 to 2 ml blood into Thioglycollate broth.

5.2.2. **Fluids**:

- Cerebrospinal Fluid and Body Fluids such as nasal antrum, ascitic, joint, peritoneal, vitreous fluid and pleural fluid must be collected in a sterile container.
- Volume of 2 ml preferable whenever possible.

5.2.3. Culture Swabs: Swabs from Ulcers, Exudates, Wound, Burns, Cervix, Vagina, etc.

- Collected into a sterile swab, preferable in VWO sterile swabs.

  Note: While collecting wound swabs clean the area with sterile normal saline and also do not apply any antiseptic lotion.

5.2.4. Feces:

- Place the feces sample in a sterile wide mouthed container.
- Never fill the bottle up to the brim. Avoid contaminating the outside of the container.
- Rectal swabs must be sent only if fresh feces cannot be obtained into a sterile test-tube and **transported immediately** to the laboratory.

5.2.5. Aspirated Pus:

- Collect with sterile precautions and place as much as possible in sterile containers. If volume is less send in the collected syringe.

5.2.6. Sputum:

- Collect in a wide mouthed sterile screw capped container an early morning, sputum sample after rinsing the mouth with plain water for a few times.
- The sputum, containing purulent material is brought out by a deep cough. (Not **saliva, pharyngeal or postnasal secretions)**
- Send specimen to the laboratory immediately to the laboratory.

5.2.7. Urine

Mid-stream specimens are taken, provided they are collected properly as follows:

- Thoroughly cleanse the genitalia with soap and water (under supervision, if a child), and wipe with a clean, dry cloth.
- Collect urine (after voiding and discarding an initial small amount) directly into a sterile wide-mouthed, screw-capped bottle.
- From catherterized patients, clamp catheter proximal to the opening. After 30 mins disconnect urobag, clean opening with 70% alcohol, release clamp, discard few drops of urine and collect in wide-mouthed sterile container.
- Collect under aseptic conditions from suprapubic region using sterile syringe.
- Send specimen to the laboratory immediately.

5.3. COLLECTION OF CLINICAL SAMPLES FOR MYCOBACTERIA CULTURES

5.3.1. Sputum

- Two, early morning, coughed up specimen should be collected.
- Place specimen in a wide-mouth sterile screw-capped bottle.

5.3.2. Urine

- Two, early morning fully voided urine sample is collected in a large sterile container.
- Transport without delay.

5.3.3. CSF and body fluids.

- Collect available material under strict asepsis and place in sterile containers without additives.

5.3.4. Gastric aspirates.

- Two, early morning fasting gastric aspirates samples collected in a sterile container.

5.3.5. Biopsies, tissue scrapings, etc.

- Collected in a sterile container and moistened with **sterile normal saline.**

5.3.6. Pus

- Aspirates are sent in a sterile container.

5.4. Sample collection for Anaerobic Culture

5.4.1. Purpose:

To isolate anaerobic bacteria from clinical specimens.

5.4.2. List of clues indicative of anaerobic infections:

a Foul odour of specimen

b Location of infection in proximity to a mucosal surface

c Infection secondary to human or animal bite

d Gas in specimen

e Previous therapy with aminoglycoside antibiotics (such as gentamicin or amikacin) or other drugs poorly active against anaerobes (older quinolones, trimethoprim /sulfamethoxazole)in the absence of concomitant effective coverage of anaerobes..

f Black discolouration of red fluorescence under UV light of blood containing exudates

g Septic thrombophlebitis

h Presence of "sulphur granules" in discharges (Actinomycosis)

i Unique morphology on Gram stain of exudates

j Failure of culture to grow aerobically, organisms seen on Gram stain of original exudates

k Zone of inhibition to metronidazole in anaerobic media

l Characteristic colonies on anaerobic agar plates.

m Anaerobic growth on selective media

n Growth in anaerobic zone of fluid media or of agar deeps.

5.4.3. Specimen collection for Anaerobic Infections:

1. Collection of the specimen in a way that avoids the contamination of the normal flora.
2. Specimen may be directly inoculated into Robertson's cooked meat media immediately after collection on bedside.

During the transport of specimen, anaerobes should not be exposed to the deleterious effect of O_2

5.4.5. Selection of specimen sites and specimens that are *inappropriate* for anaerobic culture are listed below.

I. Abdominal Gastric contents Small bowel contents Large bowel contents Illeostomy Colonostomy effluent Faeces	**II. Female genital tract** Vaginal swabs Endometrial swabs Cervical swabs
III. Urinary tract Voided urine Catherized urine	**IV. Oro pharyngeal** Throat swab Nasopharyngeal swabs Gingival swabs Expectorated sputum Bronchoscopic secretions Naso or orotracheal secretions

5.4.6. Recommended collection methods for anaerobic culture are given below.

Source	Procedure
Pulmonary	Percutaneous, transtracheal Direct lung puncture for children Plugged double or triple lumen catheter and bronchial brush with quantitative culture
Pleural	Thoracocentesis
Urinary tract	Percutaneous supra pubic bladder aspiration ; Nephrostomy tube, suprapubic catheter
Abscess: Closed Open	Decontaminate, aspirate with needle/syringe. Use of swab may yield secondary colonizers which have little clinical significance, difficult to be contaminate.
Female Genital tract	Aspiration ; Culdocentesis ; Double lumen catheter, difficult to decontaminate skin surface.
Sinus tracts	Aspirations by syringe and small plastic catheter introduced as deep as possible through decontaminated skin surface.
Draining wounds	Specimens obtained at surgery from depth of wound or underlying bone lesion. Curetting and tissue biopsies Through decontamination, collect in usual manner.

5.4.7. Transport:

Sample should be sent to the lab immediately in a humid anaerobic atmosphere at room temperature. The transport system should be properly anaerobic with an O_2 indicator, non nutritive with small sample dilution factor.

1. **Aspirate**: can be transported in a syringe within 15-20 min of collection expelling air bubble and the needle embedded into a rubber stopper.
2. **Tissue or bone samples**: Transport aerobic in a sterile container (within 15-20 min of collection).
3. **Other specimens**: Can be directly inoculated into Robertson's cooked meat media at the site of collection and then transported to lab.

Samples stored for less than 3 hrs or collected on swabs should be held at room temperature.

Aspirated pus may be sent in the syringe, after expelling air and with the needle stuck into a sterile rubber bung.
Collect specimen and inoculate directly into RCM and sent to the laboratory immediately.

5.5. COLLECTION OF CLINICAL SAMPLES FOR FUNGI

- Send skin and nail scrapings, hair, etc. in sterile containers.
- Send biopsy, pus, scrapings and sputum etc. in sterile test tubes or screw- capped bottles.

5.6. COLLECTION OF BLOOD SAMPLE FOR SEROLOGY

- Blood (3-5ml) is collected in a red-capped vacutainer.
  - It is preferable to collect blood from a fasting patient or well after two hours of consumption of a meal to avoid high quantities of lipid in the collected serum, which may interfere in some of the serological tests. Hemolysis of the specimen should be avoided at all stages.

5.7. Central venous catheter tip collection :

5.7.1. Purpose

Central venous catheter (CVC) tip collection procedure for culture and sensitivity testing.

5.7.2. Collection of CVC tip:

- Explain the procedure to the patient, including the requirement to deep breathe and hold the
- breath. Wash hands and wear apron.
- Place the patient is supine with feet raised and head down - the Trendelenburg position.
- Open the dressing pack on to a clean trolley to create a sterile field.
- Wash hands again/apply handrub. Wear sterile gloves.
- Clean the surrounding skin with 70% isopropyl alchol. Allow to dry. Clean again with povidine iodine solution. Wait for 90-120 seconds.

- Cut the sutures holding the CVC in place as close to the skin as possible.
- Ask the patient to inhale deeply and hold breath. Pull out the CVC while covering the area
- with a folded gauze swab. Apply firm pressure immediately after the line has been removed.
- Ask the patient to breathe out. Hold the gauze in place until bleeding stops and cover with transparent air occlusive dressing to
- prevent air embolus.
- Place the CVC on a sterile container supplied in dressing pack.
- Check the tip does not have a ragged edge as this would indicate it had broken off inside the
- patient, risking catheter embolus.
- Once bleeding has stopped, using sterile scissors, cut around 5cm from the end of the CVC and place inside a sterile specimen transport container.
- Dispose of waste, remove apron and wash hands.
- Dispatch sample with patient label, date and time
- Observe site for signs of bleeding and infection, usually for up to 48 hours.

5.8. SAMPLE REJECTION CRITERIA IN MICROBIOLOGY

1. Information on label not matching information on requisition.
2. Specimen transported at improper temperature.
3. Specimen not transported in the proper medium.
4. Quantity of specimen insufficient for testing.

5. Leaking Specimens.
6. Specimen transport time exceeds 2 hrs post collection and specimen not preserved.
7. Specimen received in fixative (formalin)
8. Specimen received for anaerobic culture from site known to have anaerobes as normal flora.
9. Dried up specimens.
10. Processing specimens producing information of questionable value.
    Eg: (Foley's catheter)
11. Incomplete requisition forms.
12. Improper labeling of samples.
13. Serum samples, which are hemolysed, chylous, contaminated and highly icteric.
14. Materials received on swabs for mycology.

Note: Samples are rejected only after discussion with concerned doctor/nurse in charge/any member of the unit

5.9. Tests in Microbiology :

Test Code	Test	Sample	Sample Instructions	Store at	Method	Processing schedule	Turn around time(TAT)	TAT for urgent tests	Clinical Utility/Information on the test
10505	Gram's staining	Any specimen	Any specimen in sterile container.	R	Microscopy/ Staining	Daily	4 Hours	2 Hours	To diagnose bacterial infections
10481	Acid fast staining for AFB	Any specimen	Any specimen in sterile container.	R	Microscopy/ Staining	Daily	4 Hours	2 Hours	To diagnose tuberculosis
10532	India Ink for Cryptococcus	CSF	Collected in sterile bottle	R	Microscopy/ Staining	Daily	4 Hours	1 Hour	To diagnose Cryptococcosis.

10515	KOH mount for fungus	Any specimen	Any specimen in sterile container	R	Microscopy/ Staining	Daily	4 to 24 Hours	NA	To diagnose fungal Infections.
10506	Hanging drop of stool for Vibrio cholerae	Stool	Stool sample in sterile leak proof bottle (fresh)	R	Microscopy	Daily	4 Hours	1 Hour	Presumptive diagnosis of cholera.
10523	Microscopy for Trichomonas, Gardnerella,	Vaginal secretion	Collect in a sterile test tube	R	Microscopy	Daily	4 Hours	NA	To identify Trichomonas, Gardnerella,

	Gonococci & Candida								Gonococci and Candida
10530	ANA Global (ANA, AMA & ASMA)	Serum	Specimen in a sterile test tube	R	Immuno-Fluorescence	Tuesday and Friday 8.30 am to 4.30 pm	4 Days	NA	To diagnose autoimmune disorders like SLE
10499	ANCA (cANCA / pANCA	Serum	Specimen in a sterile test tube	R	Immuno-fluorescence	Tuesday and Friday 8.30 am to 4.30 pm	4 Days	NA	To diagnose autoimmune disorders like SLE
10500	Culture Sensitivity (Aerobic) Routine	Any specimen	Sterile container	R	Routine aerobic culture and sensitivity	Daily	Three days	NA	To diagnose various aerobic bacterial infections and determine the antimicrobial susceptibility of

									the isolates.
10512	HIV I/II Ab (ELISA)	Serum	2 ml of serum	R	ELISA	Saturday 8.30 am to 4.30 PM	5 Hours	NA	For diagnosis of HIV. To be confirmed by 2 different methods as per NACO protocol
10508	HBs Ag (ELISA)	Serum	2 ml of serum	R	ELISA	Saturday 8.30 am to 4.30 PM	5 Hours	NA	Positivity indicates that patient has hepatitis B surface antigen.
10509	Anti-HCV Ab (ELISA)	Serum	2 ml of serum	R	ELISA	Saturday 8.30 am to 4.30 PM	5 Hours	NA	Positive result Indicates infection.
10493	Anti-leptospira	Serum	2 ml of	R	ELISA	Monday , Wednesday	5 Hours	NA	Positive result indicates active

	(Ig M)		serum			and Saturday 8.30 AM to 4.30 PM			infection due to leptospira
10491	Anti-Dengue virus IgM & IgG	Serum	2 ml of serum	R	ELISA	Monday , Wednesday and Saturday 8.30 AM to 4.30 PM	5 Hours	NA	IgM rise suggests active primary Infection to Dengue virus.
10525	Widal test	Serum	2 ml of serum	R	Tube agglutination	Daily 8.30 am to 4.30 pm	24 Hours	NA	To diagnose. Typhoid and Paratyphoid fevers.

10524	VDRL/RPR	Serum	2 ml of serum	R	Passive Agglutination	Daily	4 Hours	NA	Syphilis progression and response to therapy
10513	HIV –I/II Ab Rapid	Serum	2 ml of serum	R	Rapid Immunofiltration	Daily	3 Hours	NA	Rapid screening test for HIV infection
10513	HIV –I/II Ab Rapid	Serum	2 ml of serum	R	Immuno chromatography	Daily	3 Hours	2 Hours	Rapid screening test for HIV infection
10529	HBs Ag Rapid	Serum	2 ml of serum	R	Rapid Immuno-chromatograp	Daily	3 Hours	2 Hours	Rapid screening test for Hepatitis B infection

					hy				
10510	HCV Ab Rapid	Serum	2 ml of serum	R	Rapid Immunofiltration	Daily	3 Hours	2 Hours	Rapid screening test for Hepatitis C infection
10527	Blood and body fluid culture and automated identification and sensitivity (MIC) – Bactec and Phoenix	Blood and any body fluid	3 ml blood or body fluid	RT	Non-radiometric automated culture. Automated Calorimetric Identification &	Daily	3 days	NA	To diagnose various aerobic and fungal bacteremia or septicemia

					Minimum Inhibitory Concentration				
10793	Blood and Body Fluids Automated Culture	Blood /Body Fluid	5 -10 ml blood (adult) 1-3 ml Blood(pead) or body fluid	RT	Bactec automated culture method and Modified Kibry-Bauer disc diffusion	Daily	Reports given when the machine flags a positive. If negative report after overnight and 5 days	NA	To diagnose various aerobic and fungal bacteremia or septicemia
10503	Fungal culture	Body fluids, tissue, pus, stool, exudates, Respiratory tract	Specimen in sterile container	R	Sabourauds dextrose agar culture	Daily	After 48 hrs, 1 week and 3 weeks	NA	For diagnosis of fungal infections

		specimen, urine, Wound swab, corneal, nail and skin scrapings, Vaginal secretions							
10483	ANA Profile	Serum	2ml	R	Line Immunoassay	Tuesday and Friday	4hours	NA	For autoimmune diseases
10480	Mycobacterial routine culture	Body fluids, tissue, pus, stool, wound swab, urine, Respiratory	In a sterile container	R	Lowenstein Jensen media culture	Daily	After 1 week, 2 weeks, 4 weeks and 12 weeks	NA	For diagnosis of Tuberculosis

		tract specimen, gastric aspirate							
10533	Modified Acid fast staining for stool parasites	Stool	10ml in sterile container	R	Microscopy, modified ZN stain (0.5% H_2SO_4)	Daily	4 hours	NA	For diagnosis of stool parasities
10534	Modified Acid fast stain for Nocardia	Body fluids, tissue, pus, Respiratory tract specimen, urine	Specimen in sterile container	R	Microscopy, modified ZN stain (1% H_2SO_4)	Daily	4 hours	NA	For diagnosis of Nocardiosis
10484	Anaerobic culture	Pus, Body fluids, aspirates from different	Specimen in airtight sterile container or	R	Anaerobic culture using RCM or Thioglycollate	Daily	72 hours	NA	For diagnosis of anaerobic infections

		sites & catheters Tissue, Endometrium curettage. Swabs from genitalia and wound	in RCM		broth & Anaerobic Gas Pak system				
10482	Albert's Stain	Throat swab, Genital swabs, Skin,eye, ear, nasal &wound swabs, aspirate	Specimen in sterile swab	R	Microscopy	Daily	4 hours	NA	For diagnosis of Diphtheria
10519	Procalcitonin	Serum / Plasma	2ml	R	Immunochromato	Daily	4 hours	NA	For detection of

	assay(PCT)				graphy				Sepsis
10522	TPHA	Serum	2ml	R	Hemagglutination	Daily	4 hours	NA	For confirmation of Syphilis
10531	Dengue Rapid (NS1, IgM, IgG)	Serum	2ml	R	Immunochromatography	Daily	3 hours	NA	For confirmation of Syphilis
10537	Anti-HBs titre	Serum	2ml	R	ELISA	Friday	5 hours	NA	For detection of HBV antibodies
10496	Brucella Agglutination	Serum	2ml	R	Tube agglutination	Daily	24 hours	NA	For detection of Brucella antibodies
10526	Weil Felix Agglutination	Serum	2ml	R	Tube agglutination	Daily	24 hours	NA	For detection of Typhus fever
10485	Anti Cardiolipin (APLA) IgM	Serum	2ml	R	ELISA	Tuesday	4 hours	NA	For detection of Anticardiolipin antibodies
10486	Anti Cardiolipin	Serum	2ml	R	ELISA	Tuesday	4 hours	NA	For detection of

	(APLA) IgG								Anticardiolipin antibodies
10501	Dark field microscopy for Leptospira	Plasma, Urine	Plasma 2ml, Fresh urine in sterile container 10ml	RT	Dark field microscopy	Daily	4 hours	NA	For detection of Leptospirosis
10263	Skin smear AFB for Mycobacterium leprae	Slit skin smear	Smear on slide from 5 sites	RT	Modified Z.N staining (5% H_2SO_4)	Daily	4 hours	NA	For detection of Leprosy
10791	PCR by GeneXpert for MTB complex & Rifampicin resistance	Sputum, Biopsy, Aspirates, Body fluids, Urine	All in sterile containers. Sputum 1 ml, Body fluids >2ml. CSF and FNA >0.1ml,	R	Automated Cartridge Based Nucleic acid Amplification Test (CB-NAAT)	Daily	4 hours	NA	For detection of Tuberculosis

			Tissue >1gm in saline						
10528	Mycobacterial Bactec MGIT culture	Body fluids, tissue, pus, stool, sputum, urine, BAL, gastric washings, laryngeal swabs & CSF vaginal Secretions	In sterile container	R	Semi-Automated Mycobacterial culture	Daily	48 hours, 1 week and 4 weeks	NA	For detection of Tuberculosis
10794	Identification & Sensitivity (AUTOMATED) of Bacteria by PHOENIX	Pure culture from culture growth	In culture media	R	Automated Calorimetric Identification & Minimum Inhibitory concentration	Daily	48 hours	NA	For identification and sensitivity of bacteria

10795	Identification (AUTOMATED) of Bacteria/Yeast by PHOENIX	Pure culture from culture growth	In culture media	R	Automated Calorimetric Identification	Daily	24 hours	NA	For identification of bacteria and yeasts
10524	VDRL	CSF	2ml	R	Modified slide flocculation	Daily	4 hours	NA	For diagnosis of Neurosyphilis
10544	HIV-I/II Ab ECLIA	Serum	2ml	R	Enhanced Chemiluminescence	Daily	4 hours	2hours	For diagnosis of HIV
10542	HBsAg ECLIA	Serum	2ml	R	Enhanced Chemiluminescence	Daily	4 hours	2hours	For diagnosis of Hepatitis B Virus
10543	HCV-Ab ECLIA	Serum	2ml	R	Enhanced Chemiluminescence	Daily	4 hours	2hours	For diagnosis of Hepatitis C Virus
10536	Anti-HAV IgM ECLIA	Serum	2ml	R	Enhanced Chemiluminescence	Monday, Wednesday,	4 hours	NA	For diagnosis of Hepatitis AVirus

						Friday			
10537	Anti-HBs Titer ECLIA	Serum	2ml	R	Enhanced Chemiluminescence	Monday, Wednesday, Friday	4 hours	NA	For detecting HBV antibodies
10538	HBV DNA Qualitative	Plasma	3ml	F	Realtime PCR	Daily	6 hours	NA	For detection of HBV
10539	HBV DNA Quantitative (Viral load)	Plasma	3ml	F	Realtime PCR	Daily	6 hours	NA	For quantification of HBV
10540	HCV RNA Qualitative	Plasma	3ml	F	Realtime PCR	Daily	6 hours	NA	For detection of HCV
10541	HCV RNA Quantitative (Viral load)	Plasma	3ml	F	Realtime PCR	Daily	6 hours	NA	For quantification of HCV
10545	Viral Meningitis Screen-11 by PCR (HSV1&2, CMV, EBV,VZV, HHV6&7, Adeno, Entero,	CSF/Plasma	2ml	F	Realtime PCR	Daily	6 hours	NA	For Diagnosis of viral meningitis

	Paraecho &Parvovirus B19)								
10535	Water culture	Water	100ml in sterile bottle	A	Multiple tube method	Daily	48 hours	NA	For detection of water bacterial contamination

A : Ambient temperature; R : Refrigeration; F : Frozen; RT : Room Temperature.

5.10. Time limit for requesting additional test

Most specimens for microbiology investigations are best performed on fresh samples. Any additional investigations required should be discussed with the laboratory to ascertain suitability for further analysis.

Please note, due to the instability of bacteria over time and the processing required for some samples, requesting additional tests on submitted samples is not advised. Wherever possible a repeat sample should be collected.

Serology samples are aliquoted and maintained at 2-8°C for 3 days. Further tests may be requested within this time frame.

Specimen type & Time limit from collection

Urine : 24 hrs

Swabs : 24 hrs

Sputum : 24 hrs

Faeces : 48 hrs ; Sterile fluids: 72 hrs

5.11. **FACTORS THAT CAN INFLUENCE TEST RESULTS :** The following are important considerations when submitting samples for bacteriological investigation: This may affect the viability of pathogens and allow overgrowth of normal flora or contaminating organisms. Morphological appearance of cells may also be affected

Excessive temperature: Generally speaking, bacteriology samples should be kept cool. As the temperature increases bacterial activity may also increase leading to misleadingly high counts for pathogens or overgrowth of normal or contaminating flora. Excessively high temperature may kill the target organism. Some organisms do not tolerate cooling well and so there is no substitute for rapid transport.

Inappropriate specimen, site or transport medium:

If the specimen is taken from the wrong site (e.g. vaginal rather that cervical), or it is the wrong type of specimen (e.g. swab rather than pus) or it is put into the wrong transport medium (e.g. Viral transport rather than bacterial transport) then optimal recovery of the target organisms will not be possible

Delayed transport

Clinical Data:

It is essential that appropriate clinical information is supplied. This will include the specific anatomical site and the nature of the sample, history of any foreign travel, any contact with animals and occupation if this is relevant. Failure to provide relevant information may mean that the most appropriate investigation is not performed.

Antibiotic treatment: Current or recent treatment with antibiotics should be provided as this may affect the culture results obtained.

6. SPECIFIC INFORMATION ON HISTOPATHOLOGY AND CYTOLOGY :

Test Code	Test Name	Specimen	Specimen collection instructions	Storage /Transport Condition	Method	Processing schedule	Turnaround time	Clinical / other relevant information
10411	Biopsy-Frozen Section /squash	Tissue	Specimen In Saline	A; transport Immediate/as early as possible	Rapid H&E and microscopy.	Prior appointment	30 min	Restricted to Selected hospitals only
10412	Biopsy- Paraffin Method	Tissue or block	Tissue in Plain or buffered 10% Formalin: 10 times specimen volume or blocks	A	H&E and microscopy.	Daily	4 working days	Detailed history required
10414	Cell-block Histopathology	Cell block	Cell block in plain or buffered 10% formalin (10 times volume of cell	A	H&E and microscopy.	Daily	4 working days	Detailed history required

			block)					
10291 (ER); 10296(PR); 10429(ER-PR); 10721(Her 2Neu); 10785 (ER-, PR-HER2Neu); 10784 (ER-PR-HER2Neu-KI 67 Antigen); 10725 (CD3); 10726 (CD 10); 10724 (CD 20);	IHC (ER, PR, Her2Neu, CD 45,3,10,15,20,30,117,5,34,Anti CD 138, Bcl2, CK, CK 7,CK 20, Cyclin D1, Anti Desmin, Anti Melanoma(HMB 45), Anti S-100 protein, Anti SMA, Anti Lambda Light chain, Anti Kappa light chain, Vimentin,Ki 67 antigen, Epithelial Membrane Antigen(EMA) , CD 99,calretinin,Ecadherin,Synaptophysin,MOC 31 ,anti HSA, TTF-1, Cyclin D1, Alk p80, Pax 5,	Tissue or Block	Tissue in Plain or buffered 10% Formalin: 10 times specimen volume or blocks	A	Immunostaining and microscopy	Weekly	7 working days	Detailed history required

10727 (CD 15); 10728 (CD 30); 10734 (CD 34); 10731 (CD 5) ; 10730 (CD 117) ; 10743 (Anti CD 138) ;10729 (Bcl2); 10723 (CK); 10735 (Cyclin D) ; 10736 (Anti Desmin); 10737 (HMB-45) ;	CD23, CD79a, Bcl6, Tdt.							

10738(Anti S-100 protein); 10739 (Anti SMA); 10742 (Anti Lambda Light chain); 10741 (Anti Kappa light chain) ; 10744 (Vimentin); 10745 (Ki 67 antigen) ; 10746 (Epithelial Membrane Antigen, EMA) ; 10747 (CD 99); 10787								

(calretinin, Ecadherin); 10748 (Synaptophysin); 10788 (MOC 31); 10789 (,anti HSA) ; 10790(TTF-1)								
10749	Direct Immunofluorescence	Tissue	Michel's medium	A	Immunofluorescence staining and microscopy	daily	24 hours	Detailed history required.
10413	Buccal Smear For Sex Chromatin Cytology	Buccal smear	By appointment	A	PAP stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Detailed history required
10428	Cell Block-Cytology	Cell block	Body fluid in plain container (sterile)	A	H&E and microscopy	Daily 8.30 a.m – 4.30 pm	7 days	Detailed history required

10415	Cytology Of Aspirated Fluid	Fluid	Body fluid in plain container (sterile)	R	Sediment PAP,MGG stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Detailed history required
10416	Fine Needle Aspiration (FNAC)	FNAC Smears Fluid	By appointment	A	Sediment PAP,MGG stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Detailed history required
10420	Hormonal Evaluation	Smear from upper 1/3rd of lateral wall of vagina	2 unstained slides in alcohol fixative	A	PAP stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Detailed history required
10418	Sputum for Malignant Cells	Sputum	Sputum sample in sterile container	R	Cytology	Daily 8.30 a.m – 4.30 pm	48 hours	Clinical history is required
10419	Urine for Cytology	Urine	5 ml urine	R	Sediment PAP,MGG stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Clinical history is required

10420	Vaginal. Cytology Or Pap's Smear	Pap smear	2 unstained alcohol fixed slides	A	PAP stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Clinical history is required
10421	LBC (Liquid based cytology)	Cervical	Head of cervix broom in LBC fluid	A	PAP stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Clinical history required
	Nipple discharge	2 unstained smears in alcohol fixative and air dried smears or fluid	By appointment	A	Sediment PAP,MGG stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Clinical history required
10629	Ascitic /pleural/pericardial fluid/peritoneal wash for malignant cellls	fluid	Volume not less than 5 mL, but 50 mL or more preferred.	R	Sediment PAP,MGG stain & Microscopy	Daily 8.30 a.m – 4.30 pm	48 hours	Clinical history required
	Squash or crush preparation for brain	Fresh tissue sample in	By appointment	A	Toulidine blue ,H & E	Immediately	30 – 45	Clinical

	specimen	saline			& Microscopy		min	history required
	Intraoperative Cytology	a) Imprint Smear b)FNAC Smear c) Fluid	By appointment	A	Toulidine blue ,H & E , PAP Stain & Microscopy	Immediately	30 – 45 min	Clinical history required

A : Ambient ;R : Refrigeration; F : Frozen

Note :

1) **For Bone Marrow biopsy : specimen in 10% formal saline;** BM aspirate + Peripheral Smear findings mandatory Especially if Immunohistochemistry is to be carried out.
2) **For large specimen :** Preferably large container with no stuffing or anatomic distortion of specimen. Sharp cut is penetration is to be optimal (avoiding autolysis - Either rigid plastic container or plastic bag (non-spill-zipped double bag) with formalin
3) **For trucut & endoscopic biopsy/ testicular biopsy/renal biopsy/liver biopsy : specimen** Preferably in Bouin's solution or in 10% formalin – plain or buffered solution
4) For Spleen : Serial cuts to be taken if autolysis is to be avoided
5) For articulated limbs : Certificate of disposal mandatory

6) Larger Fetus: Special certificates and disposal to be made.

7) For body fluid cytology : Preferably Fresh; Full quantity upto 50 ml in plain container; delayed specimen must be sent in ice pack

7 . Specific Information on

Hematology & Clinical Pathology

7.1. HEMOGLOBIN

- Hemoglobin is the main content of the red cell, which is a conjugated protein that gives red colour to the blood.
- 2 ml of EDTA anticoagulated blood is required. Estimation is done by Cyanmethhemoglobin method using automated cell counter.
- Significance of hemoglobin estimation.
  - Decrease in hemoglobin below the normal range is an indication of anemia.
  - Increase in hemoglobin concentration is seen in diarrhea, vomiting, burns, hypoxic states, polycythemia Vera etc.
  - Used to diagnose, type and user degree of amenity.
- Report will be made available within 2hr of blood collection.
- The primary sample is kept for 24 hrs and therefore retesting after 1 day is not possible.
- Remaining blood is discarded by incineration.

7.2. PACKED CELL VOLUME (PCV) OR HEMATOCRIT

- Hematocrit is the ratio of volume of erythrocytes to that of the whole blood.
- It is expressed as a percentage
- There are two methods of measurement of PCV.
  1. Macro method using Wintrobe's tube
  2. Micro method using capillary tubes
  3. Automated method.

- Tube is centrifuged and the reading is obtained.
- 2 ml of EDTA anticoagulated blood is used.
- Readings are obtained after 30 minutes.
- Used for the diagnosis of anaemia and polycythemia.
- Value available in one and half hours.
- Sample is kept for 1 day and retesting after 1 day is not possible.
- Sample is discarded by in incineration.

7.3. ERYTHROCYTE INDICES

- Based on the results of tests which measure hemoglobin, packed cell volume and total red cell count, several calculations have been described which given quantitative information about the red cells.
- The purpose of calculating these values is mainly for the classification of anemias.
- The various indices are: -
    1. Mean corpuscular volume or MCV
    2. Mean corpuscular hemoglobin or MCH
    3. Mean corpuscular hemoglobin concentration or MCHC

- Method of estimation is by automated method or manually by using calculations.
- EDTA anticoagulated blood around 2 ml is used.

- Indices are used to classify anemias morphologically.
- Report will be made available within one and half hours.
- Sample is kept for 1 day and discarded by incineration.

7.4. ERYTHROCYTE SEDIMENTATION RATE (ESR)

- Venous blood is placed in a vertical tube.
- The red cells sediment or fall to the bottom, this length of fall of column of RBC's in a given time is called erythrocyte sedimentation rate (ESR).
- 2ml of citrated blood is collected in a vacutainers.
- Methods of ESR estimation are
    1. Westergren method
    2. Micro ESR method
    3. Wintrobe's method
- An increase in ESR is usually an indication of disease.
- Elevated in cases of chronic inflammatory conditions like tuberculosis, rheumatoid arthritis or malignancy. Can be used to follow a disease activity or response to treatment once a diagnostic is made.
- Report is made available after 1 hour.
- Sample is discarded after 1 day by incineration.

7.5. DIFFERENTIAL COUNT

- Is a method where by the number of different types of white blood cells present in a blood sample are counted.
- WBC's are expressed as total number of cells counted.
- 2 ml of EDTA anticoagulated blood is collected.
- Method of differential count
    1. Automated cell count
    2. Manual method / smears.

- Increase in neutrophil count is called neutrophilia and seen in acute pyogenic infections, acute hemolysis or hemorrhage, strenuous exercise, stress, pain, chronic myeloproliferative disorders etc.
- Decrease in neutrophil count is called neutropenia and is seen in cases of viral infections, acute leukemias, megaloblastic anemia etc.
- Report will be available within one and half hours.
- Sample will be discarded after 1 day by incineration and retesting after 1 day is not possible.
- Lymphocyte increases in cases of viral infection, children, typhoid, tuberculosis, chronic lymphocytic leukemia etc.,
- Eosinophil count increases in cases of parasitic infections, allergies, eczema, psoriasis etc.
- Total count (TC) may be increased in all the above conditions.
- Total count may be decreased in bacterial, viral or protozoal infections.

- 2 ml of EDTA anticoagulated blood is used and report is available in one and half hours.

7.6. PLATELET COUNT

- Done using 2ml of EDTA anticoagulated blood.
- Platelets are blood cells, which function in hemostasis to maintain integrity of the blood vessels.
- Methods of obtaining platelet count are
    1. Manual method / smear
    2. Automated cell count.
- Platelets are increased in physiological states such as exercise and pathological states, such as CML, myeloproliferative disorders, essential thrombocytosis, Post hemorrhagic, postsurgical states, infections, and inflammation.
- Platelets are reduced in aplastic anemia, myeloblastic anemia, acute leukemias, infections etc.
- Report is made available in one and half hours.
- Sample discarded by incineration after 1 day.

7.7. RED BLOOD CELL COUNT

- Erythrocyte count is done, usually by automated cell counter.
- Values are higher in the morning and lowest in the evening.
- 2 ml of EDTA anticoagulated blood is used.

- It is helpful to calculate the values to obtain the indices.
- The highest value is seen at birth and increased counts are also seen dehydration, severe burns, chronic lung diseases like emphysema, polycythemia etc.,
- Decreased count is seen in pregnancy, anemia etc.,
- Report is available in one and half hours.
- Sample discarded by incineration after 1 day and retesting after 1 day is not possible.
- Complete blood count includes HB, TC, and DC, ESR (Turn over time – one and half hour).

7.8. PERIPHERAL SEMAR

- 2 ml of EDTA anticoagulated blood is used.
- Blood smears are prepared on a glass slide.
- Used to assess the morphology of the blood cells and to look for abnormal cells.
- Helps in diagnosis and typing of anemia along with other parameters.
- Malaria Parasite can be visualized by this method.
- Helps to confirm thrombocytopenia and decrease or increase in other cell counts.
- Turnaround time – 24 hours.
- Sample discarded after 1 day and retesting is not possible after 1 day.
- Complete hemogram, includes – Hb, TC, DC, ESR, RBC and reticulocyte count and blood indices.

7.9. RETICULOCYTE COUNT

- Immature anuclear erythrocytes are called reticulocytes.
- 2 ml of fresh EDTA anticoagulated blood is preferred.
- Reticulocyte count can be estimated by supravital staining and microscopic examination.
- Peripheral blood reticulocyte count indicates effective bone marrow activity.
- Most useful in monitoring anemia and response to therapy.
- The results are expressed as percentage of reticulocytes in relation to total RBC count.
- Turnaround time – 4 hours.
- Sample is described after 2 days and retesting after 1 day is not possible.
- Sample is discarded by incineration.

7.10. PT / APTT

- Prothrombin or factor II is synthesized in the liver.
- The production of fibrin by means of extrinsic and intrinsic common pathways requires tissue thromboplastin and factor VII along with other factors for a stable clot formation.
- **Partial thromboplastin time (PTT)** is a simple test of the intrinsic and common pathway of coagulation.
- PT requires 3.2 mg sodium citrate and 2.7 ml blood. Centrifuged for 12 minutes.
- Method - PT is determined by automated method, using Sysmex CA-50.
- PTT requires 2ml citrated plasma (platelet poor)
- Method of determining PTT is by CA-50 optical light scatter.

- PT determination is the preferred method for pre surgical screening, determination of congenital deficiency of factors II, V, VII, X and for monitoring patients on oral anticoagulant therapy and as a liver function test.
- APTT is prolonged in Hemophilia, Vitamin K deficiency, Liver disease, DIC etc.
- PT and other coagulation tests are done within 1 hour beyond which a repeat test is not possible.
- Reports are available in 1 hour.
- Discard off by incineration.

7.11. BODY FLUIDS

- Body fluids include CSF, peritoneal, pericardial, pleural, synovial fluid etc.
- Normally a very small amount of fluid is present in the body cavities.
- 1-3 ml of fluid is required.
- Can be stored by refrigeration up to 1 week.
- **Indications:**

  CSF – Detection and diagnosis of meningitis.

  Cerebral infarction or hemorrhage

  Introduction of drugs, radiographic contrast media etc.

  Peritoneal fluid

  Ascites of unknown etiology, intra abdominal hemorrhage due to trauma, malignancies etc.

  Pericardial fluid

  Acute or chronic cardiac tamponade, pericardial effusion of unknown etiology etc.

Pleural effusion: - Effusion of unknown etiology, effusion of known etiology, intra pleural installation of drugs etc.

Report will be available within 4 hours.

Body fluids are discarded by incineration.

7.12. SEMEN ANALYSIS

Semen analysis is an integral part of evaluation of infertility.Semen consists of spermatozoa suspended in seminal plasma.

Specimen is collected by masturbation.During transportation, specimen should not be exposed to extremes temperature and preferably carried in pocket.Examination should be carried out within 2 hours of specimen collection.Report will be made available in 4 hours.

INSTRUCTIONS FOR SEMEN COLLECTION

--It is important that the semen sample is collected after a minimum of 72 hours but, not longer than 7 days abstinence from intercourse and masturbation

- **Before Collection :**

  -Urinate Prior to semen collection

  ---Wash the genitals (Penis and testes) with water and soap, and rinse thoroughly

  --Wash hands with soap and water

  --The genitals and surrounding skin should be dried with tissue paper

- **During Collection :**

  ---Keep the container opened, do not touch the inside of the container

  --Obtain the semen sample by Masturbation

  ---- Ejaculate directly into the specimen; collect the entire ejaculate

----Close the container

- **After Collection :**

  Hand over the container to sample collection staff.

  Note : If you are collecting semen at your house, the sample should be delivered to the lab within 30 minutes.

  In situations where the patient places the specimen into the container (home collection), the lab staff should hand over the appropriate container to the patient with labeling, after checking identity of the patient.

7.13. SPUTUM EXAMINATION

- Tracheo-bronchial secretions are often collectively referred to as sputum.
- Before collecting or expectorating sputum, mould should be rinsed to remove contaminants.
- Sputum should be expectorated in a clean, sterile disposable container with a screw cap.
- **Indication**

  Respiratory infections such as mycobacteria, mycotic disease, Cryptococcus etc and Bronchial asthma, bronchiectasis, lung abscess can also be diagnosed along with malignancies.
- Send specimen within 30 minutes of collection.

7.14. URINE

- Mid stream specimens may be taken

- Collect urine directly into a sterile wide mouthed, screw-capped bottle.
- Specimens should be sent to the lab within 30 minutes of collection or refrigeration can be done but no longer than 1-3 hours.
- **Indications** – Urinary tract infections, diabetes, presence of protein, glucose, blood, ketone bodies along with microscopy can be assessed.
- Report – available in one and half hours depending on the test asked for,

7.15. FECES

- Place a small quantity of formed feces in a sterile wide mouthed feces bottle or fill one third of the bottle with liquid feces.
- Never fill the bottle completely, avoid contaminating the outside of the container.
- Test for occult blood is performed on the specimen, along with examination for parasites.
- Discarded the same day of receiving.
- Retesting is not possible after 1 day.

7.16. BONE MARROW EXAMINATION

- Bone marrow aspiration is performed to examine the cellular activities of the marrow.
- Bone marrow examination is valuable in the diagnosis of disorders specifically involving the marrow such as multiple myeloma and in leukemias and some types of anemias.
- Smears done immediately.

- Report available next day.

7.17. MALARIA PARASITE : Thick and thin blood smears QBC/card method. Once prepared, stained and examined microscopically for the presence of malaria parasites.

- EDTA anticoagulated blood – 2ml is required.
- Clinical application – recognition and typing of malaria parasite for proper treatment
- Report will be made available within one and half hour.

7.18. OSMOTIC FRAGILITY TEST

- Whole blood is added to varying concentration of sodium chloride solution and allowed to incubate at room temperature.
- The main factor in the procedure is the shape of the erythrocyte. A spherocytic erythrocyte lyses more quickly.
- Increased fragility indicates increased rate of hemolysis.
- The clinical value of the procedure is in differentiating various types of anemia.
- 2 ml of EDTA anticoagulated blood is essential or heparinized whole blood may be used.
- Report next day.

7.19. HEINZ BODIES

- Heinz bodies represent unstable types of hemoglobin, which are denatured by dyes and appear as intra erythrocytic stained bodies on smear.
- 2 ml of EDTA anticoagulated blood is used.

- **Clinical application** – Heinz bodies are formed when the glycolytic enzymes in the erythrocytes are unable to prevent the oxidation of hemoglobin. They occur in G-6PD deficiency, secondary to action of certain drugs etc.

7.20. SICKLING TEST

- 2ml of EDTA sample.
- 20 minutes incubation
- Report available after 1 hr.
- Done in cases of suspected hemolytic anaemia such as sickle cell anaemia.

7.21. BT/CT

- Ivy method and capillary tube method for BT and CT respectively.
- In patient done in ward, OP done in the lab.
- Done for evaluation of abnormal bleeding as a screening test.

7.22. MICROFILARIA

- Wet smear method and fluorescent method of detection is used.
- 2 ml EDTA anticoagulated blood used.
- Report made available after one and half hours.
- Done for diagnosis and confirmation of filariasis.

7.23. FDP's

- 2ml of EDTA anticoagulated blood.
- Done by slide method
- Report will be made available within half and hour.
- Detection of FD[‘s in patients plasma indicates increased fibrinolytic activity.
- Conditions associated with increased FD[‘s include DIC, live r disease, alcoholic cirrhosis, carcinoma, MI, DVT etc.
- FDP assay represents one of the screening test for DIC and other thrombotic disorders.

7.24. FIBRINOGEN

- 3.2% Sodium Citrate with 2.7 ml of blood is required.
- Automated method
- Report will be made available in 1 hr.
- This assay measures the time for detectable clot.
- Low fibrinogen concentration will prolong the clotting time.

7.25. FACTOR ASSAY (FACTOR VIII)

- % Sodium Citrate with 2.7 ml of blood is required.
- Estimated measuring automated method.
- Report will be made available in 1 hour.
- Definite diagnosis of hemophilia A is made by estimating the factor VIII levels in the plasma of the patient.

7.26. LE CELL

- 8ml of blood and collect in conical flask with glass beads and mix of 20 minutes and send to lab.
- Kept for incubation at 37C for 1 hour.
- Report will be available the next day of receiving sample.
- This test is done when anti nuclear antibodies are suspected in a patient.
- LE cell in any phagocytic leukocyte that has engulfed the denatured nucleus of an injured cell.
- Demonstration of LE cells suggests SLE.

7.27. List of Tests in Hematology and Clinical Pathology :

Test Code	Test Name	Sample	Sample collection instructions	Storage/ Transport conditions	Test Method	Processing schedule	Turnaround time	TAT for urgent tests	Clinical Utility
10235	A.E.C. (Absolute Eosinophil Count)	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	1 Hour	To assess the degree of eosinophilia.(500-1500 =mild; 1500-5000=moderate; >5000 =severe.)
10236	Absolute Lymphocyte Count	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3Hours	1 Hour	To assess the degree of absolute lymphocytosis or lymphocytopenia
10237	Absolute Neutrophil Count	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	1 Hour	To assess the degree of absolute neutrophilia or

									neutropenia.
10239	BT (Bleeding Time) & CT(Clotting Time)	NA	For walk in patients; Blood	NA	BT – Duke method CT- capillary tube method	Daily 24 hrs pm. For walk in patients only.	2 hours	30 mins.	Bleeding time is affected by platelet function, certain vascular disorders and von Willebrand Disease. Clotting time is the time required for a sample of blood to coagulatein vitro under standard conditions. Platelet count and PT is preferred over BT and CT .
10240	Clot Retraction Time	Blood	For walk in patients	A	Clotting in test tube	Daily 24 hrs. For walk in	6Hours	3 hours	The test gives the time required for a

			;Blood			patients			blood clot to separate from the tube wall and express serum, usually completed in 18–24 hours, but retarded or absent in people with thrombocytopenic purpura.
10241	Complete Blood Count (RBC,HB, TC,DC, PC, MCV, MCH, MCHC)	Blood	2 ml Blood in EDTA Vacutainer, Direct smear.	A	Automated Cell Counter	Daily 24 hrs	3Hours	2 Hour	Used for diagnosis of anemia, infection, leukemias, clotting disorders etc.
10242	Complete Haemogram (HB, TC,DC,ESR, RBC,	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	2 Hour	This test provides information about red cells, white cells and

	PCV,MCV,MCH,MCHC, RDW, PC, PS)								platelets. Results are useful in the diagnosis of anemia, infections, leukemias, clotting disorders and many other medical conditions. ESR acts as an acute phase reactant.
10243	Erythrocyte Sedimentation Rate (ESR)	Blood	2 ml of blood in citrated vacutainer	A	Automated ; Westergren	Daily 24 hrs	2 hours	1 hour 30 mins.	ESR is an acute phase reactant which indicates presence and intensity of an inflammatory process. It is never diagnostic of a specific disease. It is used to monitor

									the course or response to treatment of certain diseases. Extremely high levels are found in cases of malignancy, hematologic diseases, collagen disorders and renal diseases.
10244	FDP(Latex Method)	Plasma	2 ml of citrated platelet poor plasma (EDTA)	F	Latex Method	Daily 24 hrs	3 hours	1 Hour	In DIC both thrombin and plasmin are generated. The breakdown products or fibrin clots and fibrinogen include D-Dimer and FDP. These analytes are also elevated when

									the coagulation and fibrinolytic systems are activated.
10246	Haemoglobin (Hb)	Blood	2 ml EDTA Blood	A	Automated cell counter	Daily 24 hrs	3 hours	2 hours.	Hemoglobin levels are used to diagnose type and degree of anemia. Several factors like age, sex, pregnancy and diurnal variations are to be considered before diagnosis of anemia is made on the basis of single hemoglobin estimation.
10248	Leukocyte Count (Differential) (DC)	Blood	2 ml of blood in EDTA vacutainer	A	Automated cell counter	Daily 24 hrs	3 hours	2 Hours	Major infection fighting cells. Also involved in reactions to

									allergies, tumor and stress in general
10249	Leukocyte Count Total (TC)	Blood	2 ml of blood in EDTA vacutainer	A	Automated cell counter	Daily 24 hrs	3 hours	2 Hours	Major infection fighting cells. Also involved in reactions to allergies, tumor and stress in general
10250	Malaria (P. Falciparum By Strip Method)	Blood	2 ml of EDTA vacutainer	R	Strip Method	Daily 24 hrs	3 hours	1 hour	Diagnosis of malaria
10251	Malaria Parasite/ Microfilaria Smear (MP/MF)	Blood	3 ml of EDTA vacutainer; Direct smear	A	Microscopy	Daily 24 hrs	3 hours	1 hour	Diagnosis of Malaria and Microfilaria
10252	Malaria Parasite Fluorescent (QBC)	Blood	2 ml of blood in EDTA vacutainer	A	Immuno fluorescence	Daily 24 hrs	2 hours	1 hour	Malaria is a protozoan parasitic infection, prevalent in

									subtropical and tropical parts of the world. This test is not to be used in lieu of conventional smear diagnosis. Occasionally, test may show negativity even in presence of smear positivity.
10253	Microfilaria (Fluorescent Method)	Blood	2 ml of blood in EDTA vacutainer collected at Mid-night	A	Immuno fluorescence	Daily 24 hrs	2 hours	1 hour	Filariasis is a disease resulting from parasitization by thread like or filiform worms called filariae. The embryos circulate in lymphatic tissues and blood as microfilaria leading to

									lymphangitis, lymphadenitis, elephantiasis and tropical eosinophilia.
10254	Microfilaria Smear	Blood	2 ml of EDTA vacutainer; Direct smear	A	M	Daily 24 hrs	3 hours	1 hour	Diagnosis of Microfilaria
10255	Packed Cell Volume (PCV)	Blood	2 ml of Blood in EDTA vacutainer	A	Automated cell counter	Daily 24 hrs	3 hours	2 Hours	In diagnosis of anemia
10256	Partial ThromboPlastin Time (PTT)	Plasma	2 ml citrated plasma. (platelet poor)	F	CA – 50 Optical Light scatter	Daily 24 hrs	3 hours	1 hour	APTT measures intrinsic and common pathways of the coagulation cascade. Prolonged APTT may be caused by heparin and other

									anticoagulants, Factor deficiencies or inhibitors such as lupus anticoagulants.
10257	Peripheral Smear (PS)	Blood	2 ml blood in EDTA and/or 2 blood smear slides	A	Microscopy	Daily 24 hrs	24 hours	3 hours	Interpretation of Morphologic variation
10258	Platelet Count	Blood	2 ml of EDTA blood in vacutainer	A	Automated cell counter	Daily 24 hrs	3 hours	2 hours	Aids in evaluating primary hemostasis
10259	Prothrombin Time (PT)	Plasma	Whole blood in Na-citrate vacutainer at Ambient temperature or 2ml of frozen citrated	F	Light scatter in CA-50	Daily 24 hrs	3 hours	1 hour	Prothrombin Time assesses the extrinsic and common coagulation pathway from Factor VII through fibrin formation.

			plasma						Results are interpreted base on INR. A prolonged INR suggests a potential bleeding disorder or if a warfarin therapy, a potential for bleeding complications.
10260	Red Blood Cell Count (RBC)	Blood	2ml of EDTA blood	A	Automated cell counter	Daily 24 hrs	3 hours	2 hrs	Aids In diagnosis of anemia and polycythemia.
10238	Red Blood Cell Indices	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	2 hrs	Gives MCV, MCH, MCHC and RDW. Aids in the evaluation of anemia
10261	Reticulocyte Count (Retic)	Blood	2ml of blood in EDTA	A	Supra Vital stain on	Daily 24 hrs	6 hours	4 Hours	Reticulocytes are produced during the process of

			vacutainer		slide				erythropoiesis and are somewhat larger than mature erythrocytes. Reticulocyte count provides an initial assessment of whether the cause of anemia is due to impaired RBC production or due to increased loss in the peripheral circulation e.g. blood loss, hemolysis.
10262	Sickling Test	Blood	2 ml of blood in EDTA Vacutainer	A	M	Daily 24 hrs	36 hours	36 hrs	Analyse at the earliest

	Skin Smear AFB	SLIT Smear	Smear on glass slide		Staining FITE	Daily	6 hours	4 Hours	Diagnosis of Leprosy
10265	MCHC (Mean Corpuscular Hemoglobin Concentration)	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	2 hrs	Gives the mean concentration of the heamoglobin within the RBCs. MCHC is reduced in Iron deficiency anemia and increased in spherocytosis.
10266	MCH(Mean Corpuscular Hemoglobin)	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	2 hrs	Gives the average mass of hemoglobin per red blood cell in a sample of blood.MCH is reduced in Iron deficiency anemia.
10267	MCV(Mean Corpuscular	Blood	2 ml EDTA	A	Automated Cell	Daily 24 hrs	3 hours	2 hrs	To assess the RBC size. Helps

	volume)		Blood		Counter				classify anemias into microcytic, normocytic or macrocytic.
10268	RDW (Red cell distribution width)	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	2 hrs	To assess the degree of RBC anisocytosis.
	MPV (Mean Platelet Volume)	Blood	2 ml EDTA Blood	A	Automated Cell Counter	Daily 24 hrs	3 hours	2 hrs	-Gives the average size of platelets found in blood . -Can be used to make inferences about platelet production in bone marrow or platelet destruction problems.
10650	Ascitic Fluid cell count and Cell	Ascitic fluid	2 ml Ascitic fluid in EDTA	R	Microscopy	Daily 24 hrs	24 hours	4 hours	For cell type and cell count

	Type		container						
10653	CSF Cell Count/Cell Type	CSF	2 ml CSF in EDTA container	R	Microscopy	Daily 24 hrs	6 hours	3 hours	Diagnosis of meningitis
10654	Pleural Fluid Cell Count/ Cell Type	Pleural Fluid	2 ml Pleural fluid in EDTA container	R	Microscopy	Daily 24 hrs	24 hours	4 hours	Aids in assessment of the type of effusion.
10278	Synovial Fluid	Synovial fluid	Synovial fluid in plain and EDTA container (sterile)	R	Microscopy	Daily 24 hrs	24 hours	4 hours	Aids in assessment of the type of effusion
10270	Pericardial fluid		Pericardial	R	Microscopy	Daily 24 hrs	24 hours	4 hours	Aids in assessment of the type of effusion
10271	Vitreous fluid		Vitreous fluid in plain and	R	Microscopy	Daily 24 hrs	24 hours	4 hours	For cell type and cell count

			EDTA container (sterile)						
10287	Bone Marrow Procedure	Bone marrow aspirate	1 ml of bone marrow in green vacutainer or minimum 4 smears of bone marrow and 2 peripheral blood smears. Fix smears in 95% ethanol for 30 min and air day	2hrs A 72hr R	Microscopy of Fleishman/ wright-giemsa stained smears	Daily 9am to 4pm	72 hours	36 hours	Diagnosis of Leukemia, Anemia, Malignancy, MDS
10288	Bone Marrow Smear	Smears	Minimum 4 smears of bone marrow and 2 peripheral blood	A	Prussian Blue Reaction	Daily 9am to 4 pm	72 hours	36 hours	Diagnosis of Leukemia, Anemia, Malignancy, MDS

			smears. Fix smears in 95% ethanol for 30 min and air day						
10289	Buffy Coat Smear		2 ml of EDTA blood		Microscopy	Daily	4 hours	2 hours and 30 mins	Diagnosis of Leukemia, Anemia, Malignancy, MDS
10290	Demo. Of Heinz Bodies	Blood	2 ml of EDTA blood and direct smear	A	Supravital staining and microscopy	Daily: 9 am – 4 pm	6 hours	6 hours	Indicate precipitation of denatured hemoglobin
10293	L.E. Cells	Blood	8ml blood without anticoagulant	A	Incubation and Microscopy	Daily 24 hrs	24 hours	24 hours	In view of low sensitivity of the test, ANA test is recommended.
10295	Osmotic Fragility Test	Blood	2ml blood EDTA	A	HA	Daily 9am & 4 pm	42hours	36hrs	Osmotic fragility measures the ability of red blood cells to

									take up certain amount of water before lysing. Increased fragility is seen in hereditary spherocytosis and elliptocytosis. Fragility is decreased in cases of thalassemia.
10297	Sickle Cell Preparation	Blood	2ml blood EDTA	R	Microscopy	Daily 9 am – 4 pm	24hours	18hrs	To demonstrate sickling of RBCs in patients with sickle cell disease.
10620	Factor 8 assay	Blood	Whole blood in 3.2% Na-citrate vacutainer at Ambient	F	Light scatter in CA-50	Daily 24 hrs	3 hours	1 hour	To detect Factor 8 deficiency

			temperature or 2ml of frozen citrated plasma						
10298	Plasma Fibrinogen	Blood	Whole blood in 3.2% Na-citrate vacutainer at Ambient temperature or 2ml of frozen citrated	F	Light scatter in CA-50	Daily 24 hrs	3 hours	1 hour	To detect abnormal plasma fibrinogen levels. Low levels of fibrinogen can indicate a systemic activation of the clotting system, with consumption of clotting factors faster than synthesis, as occurs in DIC.
10320	Stool Occult Blood	Stool	Stool in leak proof	A	Biochemical	Daily 24 hrs	2 hours	1 hour	Test is mainly performed for colorectal cancer

			container						screening
10321	Stool Reducing Sugar (Lactose)	Stool	Stool in leak proof container	A	Biochemical	Daily 24 hrs	2 hours	1 hour	Detect deficiency of intestinal border enzymes due to congenital deficiency of nonspecific mucosal injury
10322	Stool Routine & Microscopy	Stool	Stool in leak proof container	A	Biochemical Microscopy	Daily 24 hrs	2 hours	1 hour	Used for diagnosis of parasitic infections
10323	Stool for Stercobilinogen	Stool	Stool in leak proof container	A	Biochemical	Daily 9 am to 4 pm	24 hrs	12 hour	Absence of fecal stercobilinogen may be suggestive of obstructive jaundice
10324	Stool for Ova and cyst	Stool	Stool in leak proof container	A	Biochemical	Daily 24 hrs	2 hours	1 hour	Used for diagnosis of parasitic

									infections
10345	Urine Bence Jones Protein	Urine, spot	20 ml of spot urine Analyse same day	R	Biochemical	Daily	6 hours	6 hour	Detection of Bence Jones protein may be suggestive of multiple myeloma or Waldenström's macroglobuline mia.
10346	Urine Bile Salt	Urine, spot	20 ml of spot urine	R	Dipstick	Daily 24 hrs	2 hours	2 hour	Used for patients who show signs of abnormal liver function
10346	Urine Bile Pigment	Urine, spot	20 ml of spot urine	R	Dipstick	Daily 24 hrs	2 hours	2 hour	Used for patients who show signs of abnormal liver function
10348	Urine Blood (Hb/ Hb derivative)	Urine, spot	20 ml of spot urine	R	Dipstick	Daily 24 hrs	2 hours	1 hour	The presence of blood in urine may be associated with a urological cause,

									a renal cause/ be due to a UTI.
10349	Demo of Hemosiderin in Urine	urine	10 ml of random urine.	A	Prussian Blue Reaction	Daily	24 hours	24 hrs	Patients with intravascular hemolysis may have hemosiderin in urine. It may not always correlate with hemoglobinuria because of the timing of the disease process and the physiologic capacity of the kidneys and other organs to filter hemoglobin and iron.
10350	Urine for Fat Globules	Urine	10 ml of random	R	Microscopy	Daily	2 hours	1 hour	Lipiduria

			urine.						
10351	Urine Ketone Bodies	Urine, spot	10 ml of spot urine	R	Biochemical	Daily 24 hrs	2 hours	1 hour	Ketonuria
10352	Micro Examination	Urine, spot	Morning urine specimen in leak proof clean container	R	Biochemical Microscopy	Daily 24 hrs	2 hours	1 hour	Renal damage, UTI, diabetes, hypertension, drug toxicity
10353	pH	Urine	Morning urine sample in leak proof container	R	Biochemical	Daily 24 hrs	2 hours	1 hour	The test measures the level of acid in urine.
10354	Porphobilinogen	Urine		R	Biochemical	Daily 24 hrs	24 hours	6 hour	Acute intermittent porphyria causes an increase in urinary porphobilinogen
10355	Protein Urine qualitative	Urine	20ml of random	A	Biochemical	Daily 24 hrs	2 hours	1 hour	Urinary total proteins are

			urine						negligible in healthy individuals. Levels are increased in diseases that impair renal function like Diabetes, Hypertension, Nephrotic Syndrome and drug nephrotoxicity
10356	Routine (Urine Complete)	Urine	Spot urine sample in leak proof container	R	Biochemical Microscopy	Daily 24 hrs	2 hours	1 hours	Helps screening UTI and renal diseases
10357	SG-Specific Gravity	Urine	10 ml of spot urine	R	Biochemical	Daily 24 hrs	2 hours	1 hour	To assess the urine concentrating capacity of the renal tubules.

10358	Sugar (Urine)	Urine, spot	Morning urine sample in leak proof clean container	R	Biochemical	Daily 24 hrs	2 hours	1 hour	This test is most commonly used to screen for possible diabetes
10359	Test of Chyluria	Spot urine	10 ml of spot urine	R	Biochemical	Daily 24 hrs	4 hours	4 hours	Obstruction of lymphochylous system e.g. Filariasis.
10360	Urine for Eosinophilia	Urine spot	Spot urine sample	R	Microscopy	Daily 24 hrs	6 hours	6 hours	To detect presence of eosinophils in the urine
10361	Urine of Myoglobulins	Urine	10 ml of spot urine	R	Biochemical	Daily 24 hrs	24 hours	2 hours	This test measures the injury to skeletal muscles.
10355,10358	Urine Routine Examination (Albumin, Sugar)	Urine	10 ml Spot urine sample in leak proof	R	Biochemical Microscopy	Daily 24 hrs	2 hours	1 hours	To detect proteinuria and glycosuria

			container						
10363	Urobilinogen	Urine, spot	10 ml of spot urine sample	R	Biochemical	Daily 24 hrs	2 hours	Same day after 2 hrs	Test is used to confirm a diagnosis of acute intermittent porphyria
10388	Semen Analysis	Semen	Full quantity of semen sample in sterile container (Minimum 1 ml)	A	Biochemical , Microscopy	Daily 24 hrs	3 hours	Same day after 2 hours	Used for infertility work up.
10390	Sputum for Eosinophilia	Sputum	5 ml of sputum sample in sterile container	R	Microscopy	Daily 24 hrs	24 hours	Same day after 6 hours	Increased proportions of eosinophils are generally seen in the sputum of subjects with asthma, especially when there is an

									exacerbation.
10517	Urine Pregnancy test (N'sure)	Urine, spot	Spot urine sample in clean and dry container	R	One step cassette style HCG urine pregnancy test.	Daily 24 hrs	1 hour	30 mins	Used to determine the presence of HCG (Human Chorionic Gonadotropin) in urine specimens; for early detection of pregnancy.
	Fluid –RBC count	Body fluids like CSF, ascitic fluid, pleural fluid.	2 ml of fluid in EDTA container	R	Automated cell counter (Electrical impedence)	Daily 24 hrs	24 hours	4 hours	Aids in assessment of hemorrhagic fluids.
	Fluid – Hemoglobin	Body fluids like CSF, ascitic	2 ml of fluid in EDTA container	R	Automated cell counter (spectrophotometry)	Daily 24 hrs	24 hours	4 hours	Aids in assessment of hemorrhagic fluids.

		fluid, pleural fluid.							
	Fluid – Hematocrit	Body fluids like CSF, ascitic fluid, pleural fluid.	2 ml of fluid in EDTA container	R	Automated cell counter (calculated parameter)	Daily 24 hrs	24 hours	4 hours	Aids in assessment of hemorrhagic fluids.
	Fluid- RBC count, Hemoglobin and Hematocrit.	Body fluids like CSF, ascitic fluid, pleural fluid.	2 ml of fluid in EDTA container	R	Automated cell counter	Daily 24 hrs	24 hours	4 hours	Aids in assessment of hemorrhagic fluids.
	Fluid –for crystal analysis.	Synovial fluid.	2 ml of fluid in EDTA container	R	Microscopy	Daily 24 hrs	24 hours	4 hours	Aids in assessment of synovial effusion.