MANUAL	
Author:	Vijay Padayachee (as Quality Assurance Consultant) Lesley Rahman

Changes from previous version are highlighted.

Due Date of next Review	**Actual Date Reviewed**	**Reviewed /Revised by**	**Action**
21/01/2016	09/02/2015	LR	Instructions on disposal of bio hazardous waste
09/02/2016	20/03/2015	LR	See highlighted changes
26/03/2016	30/04/2018	A.W	No changes
04/2020			

Supersedes : DML-Lab C 2.2 SOP 1 Laboratory Services Manual version 9

Date withdrawn:

Approved by:

1 Introduction 5
2 Purpose 5
3 Scope 6
4 Responsibility 6
5 Definitions 6
6 Confidentiality Policy 6
7 Services offered 6
7.1 Pathology Services: 7
7.2 Advisory Services 7
8 COMPLETING DIAGNOFIRM REQUEST FORM 7
8.1 Introduction 7
8.2 Procedure for filling out the Diagnofirm Request Form 7
8.3 Verbal Test requests 8
9 Safety 8
9.1 Safety Precautions 8
9.2 Barrier Precautions 8
10 Examinations offered 9
10.1 Examination Directory for Examinations performed at Diagnofirm Medical Laboratories 10
10.2 Examination Directory for Examination Requests sent to Referral Laboratory 16
11 Biological reference intervals 25
12 Instructions on positive identification of patient 25
12.1 Verifying identification 25
12.2 Verbal identification 25
13 Primary Sample Container information 25
14 General Instruction for preparation of the patient 25
14.1 Patient's rights: 26
15 Sample Collection procedures 26
15.1 Phlebotomy Guidelines 26
15.2 Order of the Draw 26
15.3 Venepuncture Procedure 26
15.3.1 Preparation of the patient: 26
15.3.1.1Patient States 27

15.4 Venipuncture Site Selection 27
15.5 Procedure for vein selection: 28
15.6 Performance of a Venepuncture....28
15.6.1 For blood culture sample collection, follow directions as given below: 29
15.6.2 Additional considerations: 29
15.6.2.1 To prevent a hematoma:....29
15.6.2.2 To prevent hemolysis (which can interfere with many tests): 30
15.6.2.3 Indwelling Lines or Catheters:....30
15.6.2.4 Hemoconcentration: 30
15.6.2.5 Prolonged Tourniquet Application:....30
15.7 Troubleshooting guidelines for venipuncture 30
15.7.1 If an incomplete or no blood is obtained 30
15.7.2 If blood stops flowing into the tube:....31
15.7.3 Action to be taken in case of any injuries....32
15.8 Types of Samples....32
15.8.1 Single Samples. 32
15.8.3 Sequential Sampling 32
15.8.4 Serial Monitoring....32
15.9 Interference of Medications and Other Substances....33
15.9.2 Summary: Interference of Medications and Other Substances....33
15.10 Capillary Blood Collections Preparation of the patient 33
15.10.1 Precautions 33
15.10.2 Proper and Improper 34
15.10.4 Finger stick Procedure Finger stick Procedure....34
15.10.5 Finger stick Method Using a Retractable Lancet 35
15.11 Heel prick on Babies....35
15.11.1 Preparation of the patient 35
15.11.3 Heel prick procedure 36
16 Urine Collections....36
16.1 Random Sample Early / First Morning Urine....36
16.2 24-Hour Urine 37
16.2.1 Procedure for 24 hour collection 37
16.2.1.1 Instruction on collection: 37
16.3 Midstream ‘clean catch’ Urine 37
16.3.1 Midstream ‘clean catch’ Urine Procedure for Female Patients....37
16.3.2 Procedure for Midstream ‘clean catch’ Urine for Male Patients 38

16.3.3 Procedure for Straight Catheter 38
16.3.4 Procedure for Indwelling Catheter 38
16.3.5 Procedure for Suprapubic Urine 38
16.4 Preservatives and special instructions for urine collections 38
16.5 Special Requirements for Urine collections 39
17 Sputum Collection 40
18 Summary Guidelines for Microbiology Sample Collection 41
19 CYTOPATHOLOGY COLLECTION 43
19.2 Common types of samples submitted to Cytology; 43
19.3 General Precautions When Collecting Cytology Samples 43
19.4 PAP and Vault Smear Collection Technique 44
19.5 Transporting of PAP smears to laboratory 44
20 Histopathology 44
20.1 General instructions 45
21 Disposal of Healthcare waste. 45
22 Critical Values (adapted from Tietz Textbook of Clinical Chemistry 3rd Edition 45
23 Acceptance and Rejection Criteria 46
23.1 Acceptance Criteria 46
23.2 Rejection Criteria 46
24 Patient Instructions 47
24.1 Patient Instruction for Glucose Tolerance Test 47
24.2 Patient Instruction for random urine collection 47
24.4 Patient Instruction on Stool for Occult Blood 48
24.5 Patient Instruction on Stool Collection for Culture, Microscopy, Rotavirus, Adenovirus 48
24.6 Patient Instructions for Sputum Collection 48
24.7 Patient Instruction on Semen Collection 49
25 Laboratory Results Policy 49
26 Delivery of reports 49
27 Complaint procedure 49

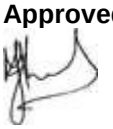
1 Introduction

Our services are geared to provide state-of-the-art and, at times, cutting edge, clinical and technical testing approaches that are cost-effective and of high quality. We are dedicated to providing accurate information in a timely manner to our doctors, other caregivers and other customers. Your regular and effective use of the information in this laboratory services manual will contribute significantly to the quality and safety of patient care. We offer a comprehensive program of clinical pathology services .The scope of examinations DML sample continues to grow as our outreach commitments increase. The Laboratories offer a full service and with the added limited use of selected external reference laboratories, a complete menu of clinical examinations is available. Although the laboratories that perform the analysis are indicated, any examination may be requested from any site, whereupon it will be referred to the appropriate laboratory. All laboratory services are internally monitored to assure provision of quality services using the principles of total quality management and application of quality systems. External monitoring of laboratory services is accomplished through participation in external quality assurance programs and proficiency testing programs. The quality of examination results is directly related to the integrity of the sample collected. Proper collection and handling of samples are essential. Accurate patient identification and proper labeling of samples are the first and most critical steps in this process. Timely sample transport and sample preparation are also necessary to ensure sample integrity and accurate results. **DML Client Services**
These services are provided to Customers that utilize the services of the laboratories.

- Establishing New Accounts – New accounts can be established by contacting the Laboratory Administrative and Finance Manager.
- Sample Transportation – On-demand and scheduled courier pick-ups are available to DML Customers depending upon location and examination volume. Contact the laboratory to request courier information.
- Supplies – DML provides Customers with appropriate quantities and types of sample collection supplies and examination requisitions. Materials can be obtaining by contacting the phlebotomy department
    - Billing – Client fee schedules can be obtained by contacting the Laboratory Accounts Department.
- Reports – Patient examination reports are delivered by courier, fax, mail or Email depending upon client preference and examination volume. Contact the laboratory to request a copy of a lab report.
- Results - Customers can obtain provisional verbal results by contacting the laboratory. Patients can obtain their examination results from their ordering doctor.
- Customer Care (Complaints and Compliments): Can be done using the Customer feedback form or contacting any one of the staff by phone or in writing via email/fax or hard copy at DML who will then forward the complaint DML Management

2 Purpose

The purpose of this manual is to provide guidelines and instructions on the request of laboratory tests and the collection, transport and storage of patient samples.



3 Scope

This manual covers the collection, handling and safety of Haemotology, Chemistry, Endocrinology, Serology, Microbiology, Cytology, Histology and HIV Monitoring tests done within the DML and referred to other laboratories. This manual makes mention of collection of samples for diseases of public health importance including polio and measles. However, full instructions in times of suspected outbreaks will be issued. All persons that request and /or collect laboratory samples and send them to DML will benefit from reference to this manual.

4 Responsibility

Designation	Contact number	E-mail
Director	3950007 ext. 201	iqbal@diagnofirm.co.bw
Laboratory Manager	3950007 ext. 210	innocent@diagnofirm.co.bw
Quality Manager	3950007 ext. 204	lesley@diagnofirm.co.bw
Pathologist	395007 ext. 205	mohan@diagnofirm.co.bw
IT Manager	3950007 ext. 208	arul@diagnofirm.bw
Finance and Administration Manager	3950007 ext. 202	accounts@diagnofirm.co.bw
HOD Virology	3950007 ext. 214	virology@diagnofirm.co.bw
HOD Microbiology	3950007 ext. 215	dml@diagnofirm.co.bw
HOD Haematology	3950007 ext. 212	haemotology@diagnofirm.bw
HOD Biochemistry	3950007 ext.213	chemistry@diagnofirm.co.bw
HOD Histology/Cytology	3950007 ext. 203	cyto@diagnofirm.co.bw
HOD Phlebotomy	3950007 ext. 207	phlebotomy@diagnofirm.co.bw
HOD Data Capture	3950007 ext. 216	frontoffice@diagnofirm.co.bw
HOD Courier Services	3950007 ext. 208	peter@diagnofirm.co.bw
Selebi Phikwe Branch Manager	2600600	nicholas@diagnofirm.co.bw
Francistown Branch Manager	2412610	tapiwa@diagnofirm.co.bw
Maun Branch Manager	6860330	charle@diagnofirm.co.bw

In case of emergency please contact: Mr. I. Mupunga on 72538098 or Mr. M.I. Chand on 71320331

5 Definitions

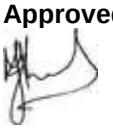
TAT – Turnaround Time
(The turnaround time for DML examinations is that interval between receipt of a samples at DML to authorisation of the result in the laboratory information system after examination completion.)

6 Confidentiality Policy

Confidentiality of information of the organisation and its customers is maintained at all times.

7 Services offered

DML offers the following Services: at Plot 12583 Nyerere Drive Middle Star Gaborone.



The location of any Diagnofirm Laboratory, Branch and depot can be obtained by telephoning the Gaborone Switchboard at 3950007 for the physical address

7.1 Pathology Services:

Performs a range of laboratory tests in the following specialties:

- Microbiology,
- Cytopathology,
- Histopathology,
- Clinical Chemistry,
- Hematology,
- Serology,
- Virology
- Endocrinology

Provides Phlebotomy services to, patients referred by private practitioners and occasionally from walk in patients.

7.2 Advisory Services

Clinical Advice
Advice on clinical management of patients or interpretation of test results.

Technical Advice
Advice on sample requirements and test procedures.

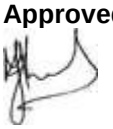
8 COMPLETING DIAGNOFIRM REQUEST FORM

8.1 Introduction

All patients or samples that referred to Diagnofirm Medical Laboratories should be accompanied by a completed Request Form, which should contain Patient details and examinations requested. If a patient does not come with a completed Request Form, or has a verbal request for laboratory examinations one will completed by the patient.

8.2 Procedure for filling out the Diagnofirm Request Form

- Fill in Surname and First name
- Circle the correct Title(Mr. Mrs. Ms.)
- Circle correct sex (M or F)
- Date of Birth (YR, MNTH, DAY)
- Postal Address



- Omang/ID/Passport number (Unique identification)
- Cellphone number
- Medical Aid name if applicable
- Medical Aid number if applicable
- Name of employer if applicable
- Business/Home Landline number
- Date and time of primary collection – YR, MNTH, DAY AND TIME.
    - Name of person collecting the primary sample.
    - Patient's signature for consent
- Referring doctor. (Please note all Referring Doctors are registered in the DML LIS. Doctors' name, physical address and or postal address , phone no's, email (where applicable).Since all necessary information is in the LIS, the request form was designed with no space for Doctors' address)
- Highlight/tick/circle the requested examinations
- If HIV is requested the Patient shall sign consent in the space provided.

8.3 Verbal Test requests

Verbal requests may be accepted in situations where an authorised test requestor requires an additional test on a sample already submitted to the lab. Biological samples usually lose their integrity with time from the time of sample collection unless adequate preservation is used. For the verbal order to be accepted, the integrity of the sample submitted must allow for the additional test requested.

9 Safety

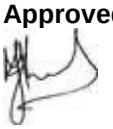
When collecting, handling and transporting samples, it is always important to adhere to the safety guidelines in order to protect and prevent spread of infections and sample contamination. These safety precautions not only protect the personnel transporting samples, it also protects staff receiving the samples and the community at large. Below are the safety precautions to be observed when collecting, handling and transporting samples:

9.1 Safety Precautions

All patients are considered to be possible carriers of pathogens. Standard precautions should always be followed, and barrier protection applied whenever samples are obtained from patients.

9.2 Barrier Precautions

a) Wear gloves when handling blood and body fluids, mucous membranes, or non-intact skin of patients; for handling items or surfaces soiled with blood or body fluids; and for performing venipuncture and other vascular access procedures.



b) Wear masks, protective eyewear, or face shields during procedures likely to generate droplets of blood or other body fluids in order to prevent exposure to the mucous membranes of your nose, mouth and eyes**.**

c) Wear gowns, coats or aprons during procedures that are likely to generate splashes of blood or other body fluids.

10 Examinations offered

10.1 Examination Directory for Examinations performed at Diagnofirm Medical Laboratories

Test	Sample	Special Conditions	Sample stability (Maximum time for running analytes on specimens)		TAT Hrs	TAT HRS	TAT HRS	TAT
			Temperature 2 - 8 o C	Room Temperature 20 - 25 o C	Gaborone	Selebi Phikwe	Francistown	Maun
Activated Partial Thromboplastin Time (APTT)	Trisodium citrate	Complete Fill of tube	4 hours	2 hours	24	48	48	48
Alanine Aminotransferase (ALT)	SST/Plain/Li Heparin		7 days	3 days	24	24	24	24
Albumin	SST/Plain/Li Heparin		1 month	1 month	24	24	24	24
Alkaline Phosphatase	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Alpha Feto Protein	SST/Plain tube		7 days	Not recommended	24	48	48	48
Amylase	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Antistreptolysin O Titre (ASOT)	SST/Plain tube		48 hours	Not recommended	24	24	24	24
Apolipoprotein A1	SST/Plain/EDTA/Li heparin		3 days	Not recommended	24	48	48	48
Apolipoprotein B	SST/Plain/EDTA/Li heparin		3 days	Not recommended	24	48	48	48
Aspartate Aminotransferase (AST)	SST/Plain/Li Heparin		7 days	4 days	24	24	24	24
Beta Human Chorionic Gonadotrophin (bHCG)	SST/Plain/EDTA/Li heparin		7 days	1 day	24	48	9	9
Beta Human Chorionic Gonadotrophin (bHCG)Screen	SST/Plain tube/random urine		3 days	8 hours	24	24	24	24
Bicarbonate (CO2)	SST/Plain/Li Heparin		7 days	1 day	24	24	24	24
Bilirubin Direct	SST/Plain/EDTA/Li heparin		7 days	2 days	24	24	24	24
Bilirubin Total	SST/Plain/EDTA/Li heparin		7 days	1 day	24	24	24	24
Blood Culture	Blood Cultures bottles	Proccess immediately if delay store at 370C	Not recommended	Not recommended	7 days	7 days	7 days	7 days
Blood Grouping (ABO and Rh(D))	EDTA/Plain tube		7 days	2 days	24	24	24	24
Brucella	SST/Plain tube		2 days	Not recommended	24	24	24	24
CA 125	SST/Plain/EDTA/Li heparin		2 days	Not recommended	24	48	48	48
CA 15.3	SST/Plain/EDTA/Li heparin		2 days	Not recommended	24	48	48	48
CA 19.9	SST/Plain/EDTA/Li heparin		2 days	Not recommended	24	48	48	48

Test	Sample	Special Conditions	Sample stability (Maximum time for running analytes on specimens)		TAT Hrs	TAT HRS	TAT HRS	TAT
			Temperature 2 - 8 o C	Room Temperature 20 - 25 o C	Gaborone	Selebi Phikwe	Francistown	Maun
Calcium (Total)	SST/Plain tube		3 weeks	7 days	24	24	24	24
CD3 (Samples recevived in Sample processing after 16:00 will be proccessed the following day)	EDTA		48 hours	2 days	24	24	24	24
CD4 (Samples recevived in Sample processing after 16:00 will be proccessed the following day)	EDTA		48 hours	2 days	24	24	24	24
CD4% (Samples recevived in Sample processing after 16:00 will be proccessed the following day)	EDTA		48 hours	2 days	24	24	24	24
CD4:CD8 ratio (Samples recevived in Sample processing after 16:00 will be proccessed the following day)	EDTA		48 hours	2 days	24	24	24	24
CD8 (Samples recevived in Sample processing after16:00 will be proccessed the following day)	EDTA		48 hours	2 days	24	24	24	24
CEA	SST/Plain/Li Heparin		2 days	Not recommended	24	48	48	48
Chloride	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Cholesterol (HDL)	SST/Plain/Li Heparin		7 days	2 days	24	24	24	24
Cholesterol (Total)	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Cortisol	SST/Plain/EDTA/Li heparin		14 days	8 hours	24	48	48	48
C-Reactive Protein (CRP) Qualitative	SST/Plain tube		2 days	Not recommended	24	24	24	24
C-Reactive Protein (CRP), High Sensitive	SST/Plain/EDTA/Li heparin		2 months	15 days	24	48	48	48
Creatine Kinase (CK)	SST/Plain/Li Heparin		7 days	2 days	24	24	24	24
Creatine Kinase MB (CKMB)	SST/Plain/EDTA/Li heparin		7 days	3 days	24	48	48	48
Creatinine	SST/Plain/EDTA/Li heparin		7 days	7 days	24	24	24	24
Creatinine Clearance 24HR	SST/Plain/EDTA/Li heparin	Height & Weight required	7 days	2 days	24	24	24	24
Cryptococcal Antigen	SST/Plain tube /CSF		3 days	Not recommended	24	48	48	48
Creatinine Clearance Random	SST/Plain tube & 24 hr urine	Height & Weight required	7 days	7 days	24	24	24	24
CSF Protein	CSF		6 days	1 day	24	48	48	48
Cytomegalovirus (CMV) IgG	SST/Plain/EDTA/Li heparin		14 days	Not recommended	24	48	48	48
Cytomegalovirus (CMV) IgM	SST/Plain/EDTA/Li heparin		14 days	Not recommended	24	48	48	48
D-Dimer (Fibrin Degredation Product)	Trisodium citrate		3 days	Not recommended	24	48	48	48

Approved by:

Test	Sample	Special Conditions	Sample stability (Maximum time for running analytes on specimens)		TAT Hrs	TAT HRS	TAT HRS	TAT
			Temperature 2 - 8 o C	Room Temperature 20 - 25 o C	Gaborone	Selebi Phikwe	Francistown	Maun
DHEA-S	SST/Plain/EDTA/Li heparin		8 days	Not recommended				
Erythrocyte Sedimentation Rate (ESR)	EDTA		24 hours	1 day	24	24	24	24
Estradiol (E2)	SST/Plain tube		7 days	1 day	24	48	48	48
Ferritin	SST/Plain/EDTA/Li heparin		7 days	1 day	24	48	48	48
Fine needle aspirations (Samples received/collected on friday and Saturday will only be processed on Monday)	Fine needle aspirations		NA	NA	3 days	4 days	4 days	4 days
Folate	SST/Plain/Li Heparin	Protected from light	7 days	Not recommended	24	48	48	48
Follicle Stimulating Hormone	SST/Plain/EDTA/Li heparin		7 days	1 day	24	48	48	48
Free T3	SST/Plain/EDTA/Li heparin		6 days	1 day	24	48	48	48
Free T4	SST/Plain/EDTA/Li heparin		6 days	1 day	24	48	48	48
Full blood Count	EDTA		1 day	1 day	24	24	24	24
Gamma Glutamyl Tranferase (GGT)	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Globulins	Calculated		NA	NA	24	24	24	24
Glucose	Sodium fluoride		7 days	2 days	24	24	24	24
Glycoslated Haemoglobin HbA1c	EDTA/Na flouride		14 days	7 days	24	48	48	48
GTT	Na flouride x 24	Samples collected at lab	NA	NA	24	24	24	24
Gynaecological cytology (Samples received/collected on friday and Saturday will only be processed on Monday)	Cervical Smears		NA	NA	30	48	48	48
Helicobacter Pylori	SST/Plain tube		3 days	Not recommended	24	24	24	24
Hepatitis A IgG	SST/Plain/EDTA		14 days	Not recommended	24	48	48	48
Hepatitis A IgM	SST/Plain/EDTA		7 days	Not recommended	24	48	48	48
Hepatitis B Core Antibody	SST/Plain/EDTA		14 days	3 days	24	48	48	48
Hepatitis B Surface Antibody (AUSAB)	SST/Plain tube		14 days	Not recommended	24	48	48	48
Hepatitis B Surface Antigen (HBsAg)	SST/Plain/EDTA		7 days	Not recommended	24	24	24	24
Hepatitis C Virus antibody	SST/Plain tube		7 days	Not recommended	24	48	48	48

Approved by:

Test	Sample	Special Conditions	Sample stability (Maximum time for running analytes on specimens)		TAT Hrs	TAT HRS	TAT HRS	TAT
			Temperature 2 - 8 o C	Room Temperature 20 - 25 o C	Gaborone	Selebi Phikwe	Francistown	Maun
Histology Large Specimens (Samples received/collected on friday and Saturday will only be processed on Monday)	Large Specimens		NA	NA	24 days	7 days	7 days	7 days
Histology Small Specimens (Samples received/collected on friday and Saturday will only be processed on Monday)	Small Specimens		NA	NA	4 days	5 days	5 days	5 days
HIV Confirmation/HIV Ag/Ab Combo	SST/Plain/EDTA/Li heparin		14 days	3 days	24	48	24	24
HIV Rapid/HIV 1&2 ELISA	SST/Plain/EDTA		7 days	Not recommended	24	24	24	24
HIV Viral Load	EDTA		3 days	3 days	48	72	72	72
Immunoglobulin E (Allergen Specific)	SST/Plain/EDTA/Li heparin		2 days	Not recommended	24	24	24	24
Infectious Mononucleosis	SST/Plain tube		2 days	Not recommended	24	24	24	24
Insulin	SST/Plain/EDTA/Li heparin		7 days	1 day	24	48	48	48
International Normalised Ratio (INR)	Trisodium citrate	Complete Fill of tube	24 hours	2 hours	24	48	24	24
Iron	SST/Plain tube		21 days	7 days	24	48	48	48
Lactate Dehydrogenase (LDH)	SST/Plain/Li Heparin		4 days	7 days	24	24	24	24
Lipoprotein (a)	SST/Plain/EDTA		8 days	Not recommended	24	48	48	48
Luteinising Hormone	SST/Plain/EDTA		7 days	1 day	24	48	48	48
Magnesium	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Malaria Antigens	EDTA		3 days	Not recommended	24	24	24	24
Malaria Smears	EDTA		24 hours	Not recommended	24	24	24	24
Non Gynae cytology (Samples received/collected on friday and Saturday will only be processed on Monday)	Pleural, acsitic, synovial,breast fluids		NA	NA	3 days	4 days	4 days	4 days
Phosphate	SST/Plain tube		4 days	1 day	24	24	24	24
Potassium	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Pro Brain Natriuretic Peptide (pro BNP)	Li Heparin		4 days	Not recommended	24	48	48	48
Progesterone	SST/Plain/EDTA/Li heparin		10 days	1 day	24	48	48	48
Prolactin	SST/Plain/EDTA/Li heparin		7 days	1 day	24	48	48	48

Approved by:

Test	Sample	Special Conditions	Sample stability (Maximum time for running analytes on specimens)		TAT Hrs	TAT HRS	TAT HRS	TAT
			Temperature 2 - 8 o C	Room Temperature 20 - 25 o C	Gaborone	Selebi Phikwe	Francistown	Maun
Prostate Specific Antigen (PSA) Total and Free	SST/Plain tube		1 day	3 hours	24	48	48	48
Protein (Total)	SST/Plain/Li Heparin		30 days	7 days	24	24	24	24
Pus Swab MCS	Swab in transport Media		NA	NA	3 days	3 days	3 days	3 days
Reticulocyte Count	EDTA		24 hours	Not recommended	24	48	48	48
Rheumatoid Factor (RF)	SST/Plain tube		2 days	Not recommended	24	24	24	24
RPR	SST/Plain/EDTA		2 days	Not recommended	24	24	24	24
Rubella IgG	SST/Plain/EDTA/Li heparin		14 days	Not recommended	24	48	48	48
Rubella IgM	SST/Plain/EDTA/Li heparin		14 days	Not recommended	24	48	48	48
Semen Analysis	Semen	Received by lab within 1 hr of collection	1 hour	1 hour	10 days	11 days	11 days	11 days
SCC	SST/Plain tube		7 days	1 day	24	48	48	48
Sex Hormone Binding Globulin (SHBG)	SST/Plain tube		8 days	Not recommended	24	48	48	48
Sodium	SST/Plain/Li Heparin		14 days	14 days	24	24	24	24
Stool Adenovirus Antigen	Random Stool		7 days	Not recommended	24	48	48	48
Stool MCS	Random Stool		NA	NA	3 days	3 days	3 days	3 days
Stool Microscopy	Random Stool		NA	NA	24	24	24	24
Stool Occult Blood	Random Stool	Contact lab for special dietary conditions	Not recommended	Not recommended	24	24	24	24
Stool Rotavirus Antigen	Random Stool		7 days	Not recommended	24	48	48	48
Testosterone	SST/Plain/EDTA/Li heparin		7 days	8 hours	24	48	48	48
Thyroid Antibodies	SST/Plain/EDTA/Li heparin		3 days	Not recommended	24	48	48	48
Thyroid Stimulating Hormone (TSH)	SST/Plain/EDTA/Li heparin		7 days	1 day	24	48	48	48
Toxoplasma IgG	SST/Plain/EDTA/Li heparin		14 days	3 days	24	48	48	48
Toxoplasma IgM	SST/Plain/EDTA/Li heparin		14 days	3 days	24	48	48	48
TPHA	SST/Plain/EDTA		7 days	Not recommended	24	24	24	24

Test	Sample	Special Conditions	Sample stability (Maximum time for running analytes on specimens)		TAT Hrs	TAT HRS	TAT HRS	TAT
			Temperature 2 - 8 o C	Room Temperature 20 - 25 o C	Gaborone	Selebi Phikwe	Francistown	Maun
Troponin I	SST/Plain/EDTA/Li heparin		24 hours	Not recommended	24	24	24	24
Transferrin	SST/Plain tube		3 days	Not recommended	24	24	24	24
Triglycerides	SST/Plain/Li Heparin		7 days	2 days	24	24	24	24
UGA MCS	Swab in transport Media		NA	NA	3 days	3 days	3 days	3 days
Urate (Uric acid)	SST/Plain/Li Heparin		7 days	3 days	24	24	24	24
Urea	SST/Plain/Li Heparin		7 days	7 days	24	24	24	24
Urine Chemistry	Mid stream urine		NA	NA	24	24	24	24
Urine MCS	Mid stream urine		NA	NA	3 days	3 days	3 days	3 days
Urine Microscopy	Mid stream urine		NA	NA	24	24	24	24
Urine random Microalbumin	Mid stream urine		7 days	2 hours	24	24	24	24
Vitamin B12	SST/Plain/EDTA/Li heparin		7 days	3 days	24	48	48	48
Weil Felix	SST/Plain tube		2 days	Not recommended	24	24	24	24
Widal Test	SST/Plain tube		2 days	Not recommended	24	24	24	24
ZN Stain	Sputum/Fliuds		NA	NA	24	24	24	24

Approved by:

10.2 Examination Directory for Examination Requests sent to Referral Laboratory

(Please not this List is not exhaustive of all the examinations sent to Referral laboratory as some examinations that are new or not frequently requested may not be on this list. Please contact the Main laboratory Gaborone (3950007) if the required examination is not on this list)

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
ABO Virus	EDTA	No special Instructions	10
ACE Angiotensin Converting Enzyme	SST	No special Instructions	3
ACTH Adrenal Cortico Tropic Hormone	EDTA	Sample sent on ice	3
Acetaminophen (Parcetemol)	SST	No special Instructions	3
Acetysalicylic Acid	SST	No special Instructions	3
Adenosine deaminase	SST	No special Instructions	3
Adrenal Antibodies	SST	No special Instructions	3
Aldolase	SST	No special Instructions	3
Aldostrone	SST	No special Instructions	3
Alpha 1 Antrypsin	SST	No special Instructions	3
Amikacin	SST	No special Instructions	3
Amoeba	SST	No special Instructions	3
ANA	SST	No special Instructions	3
ANF	SST	No special Instructions	3
ANCA C and ANCA P	SST	No special Instructions	4

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Anti Cardiolipids	SST	No special Instructions	4
Anti CCP	SST	No special Instructions	4
Anti Centromere Antibody	SST	No special Instructions	4
Anti Dnase	SST	No special Instructions	4
Anti I A2 Abs	SST	No special Instructions	4
Anti Insulin Abs	SST	No special Instructions	4
Anti Islet Abs	SST	No special Instructions	4
Anti Mullerian Hormone	SST	No special Instructions	4
Anti Parietal Cell Antobody	SST	No special Instructions	4
Anti Phospholipids	SST	No special Instructions	6
Anti Platelet Antibodies	EDTA x6	No special Instructions	10
Anti Thrombin III	Citrate	Separated Plasma on Ice	4
Anti Thrombin Mutation G2020	EDTA	No special Instructions	4
Aspegellosis Precipitus	SST	No special Instructions	4
Bee Sting Allergy	SST	No special Instructions	4
Bence Jones protein	Random Urine	No special Instructions	4
Benzodiazeoines	SST	No special Instructions	4
Beta 2 Microglobulin	SST	No special Instructions	4
Bilharzia Profile	SST	No special Instructions	4
Blood Alcohol	SST	Do not swab collection site with alcohol	3

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Bone Specific Alkaline Phosphate	SST	No special Instructions	4
Borreila IgG	SST	No special Instructions	4
C- Peptide	SST	No special Instructions	4
C. Burnetti Abs	SST	No special Instructions	4
Ca 72-4	SST	No special Instructions	4
Caeruloplasim	SST	No special Instructions	4
Calicitonin	SST	No special Instructions	20
Cardiolipin antibodies	SST	No special Instructions	4
CD 56 (Natural Killer cells)	EDTA	No special Instructions	5
Chalmydia Antobodies	SST	No special Instructions	4
Cholinesterase	SST	No special Instructions	4
Chromagranin	EDTA	On Ice	4
Chromosomes/Karyotyping	Heparin x 2	No special Instructions	10
Complement Factors	SST	No special Instructions	4
Cotinine	SST	No special Instructions	3
Coxsackie Abs	SST	No special Instructions	6
Cyclosporin	EDTA	No special Instructions	4
Cystic Fibrosis	EDTA	No special Instructions	5
Cysticercisis	SST	No special Instructions	5
Digoxin	SST	No special Instructions	4

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Diptheria Antibodies	SST	No special Instructions	15
Downs Syndrome	SST (16 - 20 weeks Para)	Sent with special request form	5
DNA Crithidia	SST	No special Instructions	4
DNA Double Strand	SST	No special Instructions	4
D-Xylose	EDTA	No special Instructions	5
Epstein Barr Virus (EBV) Profile	SST	No special Instructions	4
ENA Screen	SST	No special Instructions	4
ENA Profile	SST	No special Instructions	4
Endomysial Abs	SST	No special Instructions	4
Fibrinogen	Citrate	Separated Plasma on Ice	4
Food Allergy	SST	No special Instructions	4
Free bHCG	SST	No special Instructions	5
Free PSA	SST	No special Instructions	3
Friberg	SST	No special Instructions	9
Fructosamine	SST	No special Instructions	3
Fungal Cultures	All specimens	No special Instructions	30
G6PD	EDTA	No special Instructions	2
GCFT	SST	No special Instructions	4
Gastrin	SST fasting	No special Instructions	4
Gentamicin	SST	No special Instructions	4

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Gliadin Abs IgA, IgG	SST	No special Instructions	4
Growth Hormone	SST	No special Instructions	4
Gluten IgE, IgA, IgG	SST	No special Instructions	4
Haemoglobin Electrophersis	EDTA	No special Instructions	5
Haptoglobin	SST	No special Instructions	5
HB e Ag/Ab	SST	No special Instructions	5
Hepatitis B Viral Load (PCR)	EDTA	No special Instructions	5
Hep B Core IgM	SST	No special Instructions	3
Herpes Profile	SST	No special Instructions	4
Hepatitis C Viral Load (PCR)	EDTA	No special Instructions	4
HIV p24	SST	No special Instructions	3
HIV PCR qualitative	EDTA	No special Instructions	4
HIV resistance Testing	EDTA	No special Instructions	21
HIV Western Blot	SST	No special Instructions	10
HLA B27	EDTA	No special Instructions	7
Homocystine	EDTA	Separated Plasma on Ice	3
Hydatid/Echinoccus Abs	SST	No special Instructions	4
IGF 1 (Somatonedin)	SST	No special Instructions	5
IgG subsets	SST	No special Instructions	3
Immunoglobins IgG, IgA, IgM	SST	No special Instructions	3

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Immunophentyping	**Bone Marrow**	No special Instructions	7
Indirect Coombs Test	**EDTA**	No special Instructions	3
Insulin like growth factor	**SST**	No special Instructions	8
Interleukin	**SST X 6**	No special Instructions	7
Intrinsic Factor	**SST**	No special Instructions	4
Kappa/Lamda Light Chain ratio	**SST**	No special Instructions	7
Kidney Stone	**Kidney stone**	No special Instructions	7
Lactate	**Fluoride**	Separated Plasma on Ice	2
Lamotrigin	**SST**	No special Instructions	4
Lapto spiral	**SST**	No special Instructions	7
Lead	**EDTA**	No special Instructions	7
Legionella Abs	**SST**	No special Instructions	7
Leiden Factor V	**EDTA**	No special Instructions	4
Lipase	**SST**	No special Instructions	3
Listeria Abs	**SST**	No special Instructions	7
Lithium	**SST**	No special Instructions	3
Lupus Anti Coagulant	**Citrate**	Separated Plasma on Ice	5
Lymes disease	**SST**	No special Instructions	7
Lymphoma Venereum	**SST**	No special Instructions	30
MAI	**Heparin**	No special Instructions	10

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Measles Abs	SST	No special Instructions	4
Mitichrondrial Abs	SST	No special Instructions	4
Mumps Abs	SST	No special Instructions	4
Mycobactrium Culture	sputum , blood Heparin x 2	No special Instructions	10
Mycoplasma Abs	SST	No special Instructions	4
Oestriol E3	SST	No special Instructions	3
Osmolalaity Urine	24 hour urine	No special Instructions	3
Osmolality Blood	SST , Fluoride (fasting)	No special Instructions	3
PAPP A	SST	No special Instructions	5
Parathyroid Hormone	SST	No special Instructions	5
Paternity	EDTA x 1 (CHILD BOTH PARENTS)	Sent with special request form	14
PCR Chlamydia	Urine	No special Instructions	7
PCR CMV	EDTA	No special Instructions	7
PCR GC	Urine	No special Instructions	7
PCR HPV	Dry Swab no transport media	No special Instructions	7
Phaditop RAST allergy Inhalant	SST	No special Instructions	4
Phenobarbarbital	SST	No special Instructions	4
Phenytoin	SST	No special Instructions	4
Phenol	Random Urine	Sample sent on ice	14
Phetothazide	EDTA	Sample wrapped in foil	14

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Phorphyrins Blood	heparin x 2	samples wrapped in foil	4
Phorphyrins Urine Stool	Random Urine Random stool	samples wrapped in foil	4
Protein Electrophersis	SST	No special Instructions	4
Protein C	Citrate	Separated Plasma on Ice	4
Protein S	Citrate	Separated Plasma on Ice	4
Red Cell Folate	EDTA	No special Instructions	4
Reducing Substances	Stool	No special Instructions	3
Rennin	EDTA	Samples sent on dry ice	5
Rickettsa Abs	SST	No special Instructions	5
Rift Valley Fever	SST	No special Instructions	14
Ristocetin co factor	Citrate	Separated Plasma on Ice	4
S 100B (Malignant Melanoma)	SST	No special Instructions	3
Selenium	Urine and Blood drawn needle plain tube no gel	No special Instructions	14
Serotonin	EDTA	Separated Plasma on Ice	5
Sperm Morphology	Sperm slides	No special Instructions	10
TB PCR	Urine	No special Instructions	10
Tegretol (Carbamazepine)	SST	No special Instructions	3
Tetanus Abs	SST	No special Instructions	5
Thiamine levels (Vit B1)	EDTA X 2	samples wrapped in foil	25
Theophlline	SST	No special Instructions	3

TEST	Sample	COLLECTION/TRANSPORTATION CONDITIONS	TAT DAYS
Tricyclic anti depressants	SST	No special Instructions	3
Thrombin Time	Citrate	Separated Plasma on Ice	3
Tick Bite Profile	SST	No special Instructions	5
Tissue Polypeptide Ag TPA	SST	No special Instructions	5
Tissue Transglutin IgA, IgG	SST	No special Instructions	5
Triple screen test	SST (16 - 20 weeks Para)	Sent with special request form	5
Urine amino acids	Urine	samples wrapped in foil on ice	21
Urine NTX	Second sample in morning	Sample wrapped in foil	7
Valporate/Valporic Acid	SST	No special Instructions	3
Vitamin A	SST	Sample wrapped in foil on ice	7
Vitamin B 6	EDTA	Keep cool	30
Vitamin D 25 OH	SST	No special Instructions	5
Von Willibrand	Citrate	Separated Plasma on Ice	3
VMA	24 hour urine 20 mls HCL added	No special Instructions	10
Zinc	Plain Tube no gel	Sample separated serum wrapped in foil	7

11 Biological reference intervals

Contact the laboratory for the current biological reference intervals.

Refer to the patients report for the current biological reference intervals.

12 Instructions on positive identification of patient

12.1 Verifying identification

Identify the patient by obtaining patient identity card which may be Passport/Omang/ Driver's License or Employers identification card provided a photo is on the card or

12.2 Verbal identification

- Greet the patient
- Identify yourself.
- Ask the patient to state his/her full name.
- Never ask, "Are you Mrs. X?"
- Ask the patient's date of birth and ask them to spell their names.
- Compare the information to that on the Laboratory Request form

13 Primary Sample Container information

The provider submitting the sample is responsible for the correct labeling of the sample(s).

a) In the presence of the patient before sample collection, label the collection container.
b) Use a permanent inked pen to label the container.
c) The following essential information must be documented in a legible manner on sample container:
    - Patient name and Surname
    - Date and time of collection
    - Initials of the phlebotomist (sample collector)

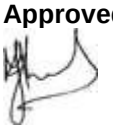
14 General Instruction for preparation of the patient

The phlebotomist's role requires a professional, courteous, and understanding manner in all contacts with the patient. Greet the patient and identify yourself and indicate the procedure that will take place.

Effective communication - both verbal and nonverbal - is essential.

Proper patient identification MANDATORY. If an inpatient is able to respond, ask for a full name and always check for confirmation.

If possible, speak with the patient during the process. The patient who is at ease will be less focused on the procedure.



Always thank the patient and excuse yourself courteously when finished.

14.1 Patient's rights:

Some of the basic patient rights are given below. The patient has the right to:

- Considerate, respectful care.
- Confidentiality of all communications and other records pertaining to the patient's care.
- Expect that any discussion or consultation involving the patient's case will be conducted discreetly and that individuals not directly involved in the case will not be present without patient permission.
- Expect reasonable safety congruent with the practices and environment.
- Know the identity and professional status of individuals providing service.
- Regardless of the source of payment, request and receive an itemized and detailed explanation of the total bill for services rendered.

15 Sample Collection procedures

15.1 Phlebotomy Guidelines

15.2 Order of the Draw

When multiple samples are drawn from a single venipuncture, the following order is recommended:

(1) Sterile blood culture tubes,

(2) Non-additive clotting tubes (red),

(3) Coagulation tubes and tubes containing citrate (blue),

(4) Serum-separator tubes,

(5) Tubes containing heparin (green),

(6) Tubes containing EDTA (lavender, royal blue),

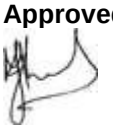
(7) Tubes containing acid citrate dextrose (yellow), and

(8) Tubes containing sodium fluoride and potassium oxalate (grey).

NOTE: Tubes with additives must be thoroughly mixed. Erroneous test results may be obtained when the blood is not thoroughly mixed with the additive.

15.3 Venepuncture Procedure

15.3.1 Preparation of the patient:



It is important to gain the patient's understanding and cooperation in obtaining an acceptable sample. The patient's response is partly determined by your attitude and by the degree of self-confidence you show.

15.3.1.1Patient States

- **Basal State.** In general, samples for determining the concentration of body constituents should be collected when the patient is in a basal state (i.e., in the early morning after awakening and about 12-14 hours after the last ingestion of food). Reference intervals are most frequently based on samples from this collection period.

The composition of blood is altered after meals by nutrients being absorbed into the bloodstream. Consequently, postprandial blood (blood drawn after a meal) is not suitable for some chemistry examinations. An overnight fast is preferable (from 8 PM of the evening previous to collection) to ensure that the patient is in the basal state. This minimizes the effects of ingested substances on the examination results. Before you collect the sample, ask the patient when he/she last ate or drank anything. If the patient has eaten recently and the doctor wants the examination to be performed anyway, you should indicate "non-fasting" on the examination request form. In the clinical information/comments section of the examination request form, indicate the time the patient ate.

Fasting or diet restrictions, such as low-fat diets, should be explained in detail, particularly to aged or overanxious patients or their caregivers. Inform patients that fasting does not include abstaining from water. Dehydration resulting from water abstinence can alter examination results. When samples are not collected in the basal state, the following additional effects should be considered when interpreting examination results.

- **Exercise.** Moderate exercise can cause an increase in blood glucose, lactic acid, serum proteins, and Creatine Kinase (CK).
- **Emotional or Physical Stress.** The clinical status of the patient can cause variations in examination results.
- **Time of Day of Collection.** Diurnal variations and variations in circadian rhythm can also affect examination results. For example, growth hormone peaks in the morning before waking and decreases throughout the day. Serum iron levels may change as much as 30% to 50%, depending on individual variation, from morning until evening.
- **Note:** For profile examination, 12- to 14-hour fasting samples are recommended.

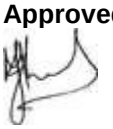
15.4 Venipuncture Site Selection

Although the larger and fuller median cubital and cephalic veins of the arm are used most frequently, wrist and hand veins are also acceptable for venipuncture.

Certain areas are to be avoided when choosing a site:

- Extensive scars from burns and surgery - it is difficult to puncture the scar tissue and obtain a specimen.

- The upper extremity on the side of a previous mastectomy - test results may be affected because of lymph edema.



- Hematoma - may cause erroneous test results. If another site is not available, collect the specimen distal to the hematoma.
- Intravenous therapy (IV) / blood transfusions - fluid may dilute the specimen, so collect from the opposite arm if possible.
- Edematous extremities - tissue fluid accumulation alters test results.

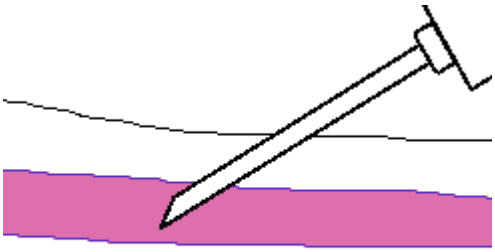
15.5 Procedure for vein selection:

Palpate and trace the path of veins with the index finger. Arteries pulsate, are most elastic, and have a thick wall. Thrombosed veins lack resilience, feel cord-like, and roll easily.

If superficial veins are not readily apparent, you can force blood into the vein by massaging the arm from wrist to elbow, tap the site with index and second finger, apply a warm, damp washcloth to the site for 5 minutes, or lower the extremity to allow the veins to fill.

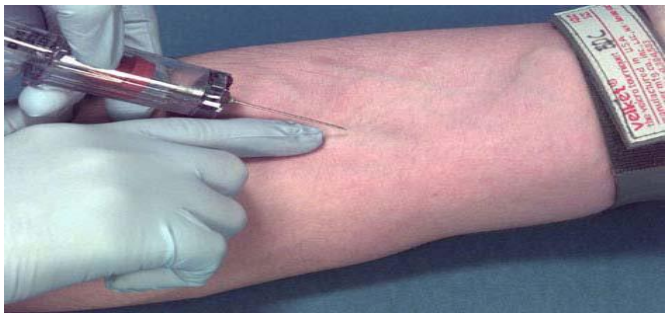
15.6 Performance of a Venepuncture

- Approach the patient in a friendly, calm manner. Provide for their comfort as much as possible, and gain the patient's cooperation.
- Identify the patient correctly.
- Verify the patient's condition. Fasting, dietary restrictions, medications, timing, and medical treatment are all of concern and should be noted on the lab requisition.
- Prepare and label blood collection tubes
- Position the patient. The patient should sit in a chair, lie down or sit up in bed. Hyperextend the patient's arm.
- Apply the tourniquet 3-4 inches above the selected puncture site. Do not place too tightly or leave on more than 2 minutes.
- The patient should make a fist without pumping the hand.
- Select the venipuncture site.
- Prepare the patient's arm using alcohol swab. Cleanse in a circular fashion, beginning at the site and working outward. Allow to air dry.
- Grasp the patient's arm firmly using your thumb to draw the skin taut and anchor the vein. The needle should form a 15 to 30 degree angle with the surface of the arm. Swiftly insert the needle through the skin and into the lumen of the vein. Avoid trauma and excessive probing.



- When the last tube to be drawn is filling, remove the tourniquet.
- Remove the needle from the patient's arm using a swift backward motion.

- Press down on the gauze once the needle is out of the arm, applying adequate pressure to avoid formation of a hematoma.
- Dispose of contaminated materials/supplies in designated containers.
- Mix.
- Affix a patient sticker on the tube.
- Deliver specimens promptly to the laboratory.



15.6.1 For blood culture sample collection, follow directions as given below:

- BLOOD CULTURES help identify bacterial pathogens and appropriate antibiotics to combat an infection. Meticulous site preparation and collection technique prevent misleading findings through contamination.
- Check the order. If other blood tests or antibiotics are ordered, collect blood culture specimens before other specimens and before the patient starts antibiotic therapy.
- Take a patient history regarding fever and current or recent antibiotic therapy. If he's currently receiving antibiotics, select culture bottles that are treated to neutralize antibiotics in the blood sample.

Adult –

1. Cleanse skin with alcohol swab.
2. When dry clean with iodine swab. Use a side-to-side motion to scrub the site with the swab for a full 30 seconds; allow site to dry completely (at least 30 s.) before venipuncture. Do not touch site after prep. If patient is allergic to iodine, cleanse site with 70% alcohol for 60 seconds.
3. Remove overcaps from bottles (1 aerobic and 1 anaerobic) and cleanse each rubber septum with separate 70% alcohol swabs. Allow septum to dry for 1 min before inoculating.
4. Draw 10-20 ml of blood using a syringe and needle and inoculate each bottle with 10 ml of blood. For the culture bottle in use the least amount of blood that can be added is 3 mls do not vent or overfill bottles.
5. Transport time <2 h.

Pediatric –

1. Prepare skin and bottles as for adult. Collect as much blood as possible up to 3 ml per bottle. The least amount of blood per pediatric bottle is 1ml.

For blood alcohol sample collection: swab the site with water not alcohol.

15.6.2 Additional considerations:

15.6.2.1 To prevent a hematoma:

- Puncture only the uppermost wall of the vein
- Remove the tourniquet before removing the needle
- Use the major superficial veins

- Make sure the needle fully penetrates the upper most wall of the vein. (Partial penetration may allow blood to leak into the soft tissue surrounding the vein by way of the needle bevel)
- Apply pressure to the venipuncture site

15.6.2.2 To prevent hemolysis (which can interfere with many tests):

- Mix tubes with anticoagulant additives gently 5-10 times
- Avoid drawing blood from a hematoma
- Avoid drawing the plunger back too forcefully, if using a needle and syringe, and avoid frothing of the sample
- Make sure the venipuncture site is dry
- Avoid a probing, traumatic venipuncture

15.6.2.3 Indwelling Lines or Catheters:

- Potential source of test error
- Most lines are flushed with a solution of heparin to reduce the risk of thrombosis
- Discard a sample at least three times the volume of the line before a specimen is obtained for analysis

15.6.2.4 Hemoconcentration:

An increased concentration of larger molecules and formed elements in the blood may be due to several factors:

- Prolonged tourniquet application (no more than 2 minutes)
- Massaging, squeezing, or probing a site
- Long-term IV therapy
- Sclerosed or occluded veins

15.6.2.5 Prolonged Tourniquet Application:

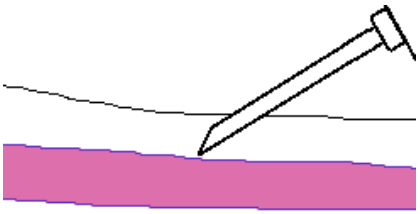
- Primary effect is hemoconcentration of non-filterable elements (i.e. proteins). The hydrostatic pressure causes some water and filterable elements to leave the extracellular space.
- Significant increases can be found in total protein, aspartate aminotransferase (AST), total lipids, cholesterol, iron

Affects packed cell volume and other cellular elements

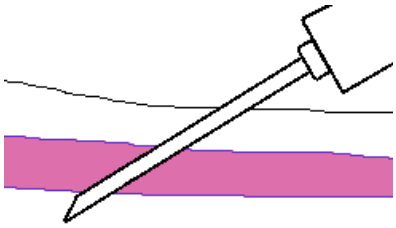
15.7 Troubleshooting guidelines for venipuncture

15.7.1 If an incomplete or no blood is obtained

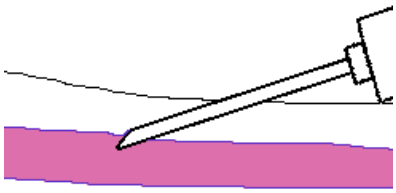
- Change the position of the needle. Move it forward (it may not be in the lumen)



- Or move it backward (it may have penetrated too far).



– Adjust the angle (the bevel may be against the vein wall).

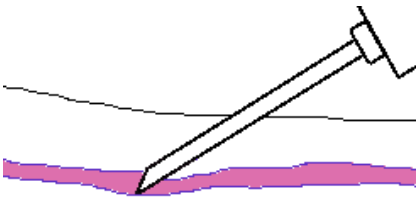


- Loosen the tourniquet. It may be obstructing blood flow.
- Try another tube. There may be no vacuum in the one being used.
- Re-anchor the vein. Veins sometimes roll away from the point of the needle and puncture site.

15.7.2 If blood stops flowing into the tube:

– The vein may have collapsed; re-secure the tourniquet to increase venous filling. If this is not successful, remove the needle, take care of the puncture site, and redraw.

- Do not attempt more to obtain blood from more than two puncture sites.



- The needle may have pulled out of the vein when switching tubes. Hold equipment firmly and place fingers against patient's arm, using the flange for leverage when withdrawing and inserting tubes.

15.7.3 Action to be taken in case of any injuries

- In the event of any injury occurring to the patient or phlebotomist, it must be immediately reported to the Health and Safety Officer or Laboratory Manager who will assist in seeking medical attention.

- An Accident Investigation Form must also be completed**.**

15.8 Types of Samples

There are two types of timed blood samples: One is for a single blood sample ordered to be drawn at a specific time. The other is for an examination that may require multiple blood samples to be collected at several specific times.

15.8.1 Single Samples.

Here are some instances in which timed single samples may be required.

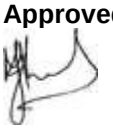
- Fasting plasma glucose alone or in conjunction with a random glucose determination. Fasting here is defined as no caloric intake for at least 8 hours.
- Postprandial glucose may be performed 2 hours after a meal for a timed examination that is helpful in diabetes detection.
- Blood glucose determinations may be ordered at a specific time to check the effect of insulin treatment.
- Blood cultures may be ordered for a specific time if a bloodstream bacterial infection is suspected.
- Therapeutic monitoring of patients on medication. Here are some instances in which timed multisample examinations may be ordered.

- The most common timed procedure is a glucose tolerance examination. First, a blood sample is drawn from a fasting patient. Then, the patient is given glucose orally and blood samples are drawn at fixed intervals, beginning with a 30-minute sample for the glucose tolerance examination.
- To examine the effect of a certain medication, a doctor may order the same examinations to be obtained on consecutive days, before, during, and after the patient has received a medication.
- Collection of an acute and convalescent serum to aid in the diagnosis of a viral infection when culturing is not feasible.
- Other examples include such examinations as occult blood, ova and parasites, and blood cultures.

15.8.3 Sequential Sampling

- Diagnosis of many endocrine diseases requires sequential sampling of blood and/or urine.

15.8.4 Serial Monitoring



Monitoring a patient over time for a specific condition is a variation of sequential sampling. Many tumor markers (examinations used to follow the patient's response to treatment for cancer) are monitored over the course of several years.

15.9 Interference of Medications and Other Substances

Many common prescription and nonprescription (over-the-counter) medications can interfere with chemical determinations or alter levels of substances measured. Drug interference is so complicated and often method-dependent that only general recommendations can be stated here. Precautions to be observed must be determined by the doctor, and the patient must then be told to avoid specified medications for the necessary periods of time prior to sample collection.

If the patient cannot be taken off the medication in question, its presence should be noted on the examination request form. For practical purposes, unless drug interference can be avoided by ordering an alternate examination method, drug therapy under supervision of the clinician may be discontinued for a period of 2-3 days and examinations repeated, especially in cases where false abnormal (and occasionally false normal) findings are suspected.

15.9.2 Summary: Interference of Medications and Other Substances

- Unlike urine, drug concentrations are usually very low in blood, and direct drug interference is less likely to occur. Drugs or their metabolites are frequently concentrated in the urine in sufficient amounts to interfere significantly with urine assays. (See appendices or individual examination for specific information.)
- Drug interference of notable clinical significance has been well-documented in the following instances.
    - Thiazide diuretic therapy. The pharmacologic or toxic effect is hyperuricemia and hyperglycemia.
    - Catecholamine assay. If a "24-hour drug abstinence period" for a patient is not possible, VMA or metanephrines should be ordered.
    - Oral contraceptives cause a decrease in serum vitamin B_{12} levels that is, in many cases, indistinguishable from vitamin B_{12} deficiency of any cause. They also cause an increase in total serum thyroxine-binding globulin. This results in an increase in both total serum thyroxine and unsaturated thyroxine-binding globulin, but with no significant change in unbound (free) thyroxine.

Many medications have been shown to have long-term residual effects that interfere with examination.
Blood Chemistry and Hematology

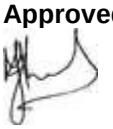
15.10 Capillary Blood Collections Preparation of the patient

a) Clean the site to be punctured with an alcohol sponge.
b) Dry the cleaned area with a dry cotton sponge.

15.10.1 Precautions

The best locations for collecting capillary samples are the 3rd and 4th fingers of the non-dominant hand and the edges of the heel (infants).

The following precautions apply to fingersticks.



• Do not use the tip of the finger or the center of the finger.

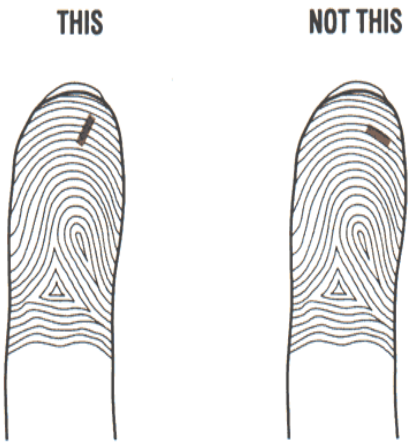
• Avoid the side of the finger where there is less soft tissue, where vessels and nerves are located, and where the bone is closer to the surface.

• Avoid the 2nd (index) digit, which tends to have thicker, callused skin.

• Avoid the 5th digit, which tends to have less soft tissue overlying the bone.

• Avoid puncturing a finger that is cold, cyanotic, swollen, scarred, or covered with a rash.

15.10.2 Proper and Improper



Finger stick Sites

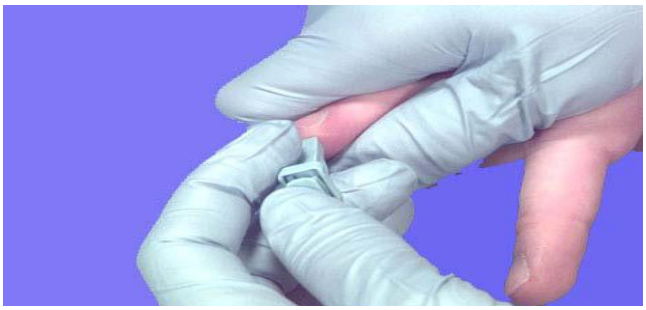
15.10.4 Finger stick Procedure Finger stick Procedure

The retractable lancet is used most often for safety reasons. The retractable lancet is spring-loaded and the lancet retracts into the body of the device after skin puncture.

The recommended depth of puncture is 2.5 mm for adults, 2.0 mm for children, and 1.5 mm for infants less than 6 months of age. All lancets are sterile and for one-time use only.

a) Follow the procedure as outlined above for identifying the patient.
b) Position the patient. The patient should sit in a chair, lie down, or sit up in bed. Hyper extend the patient's arm.

c) Massage the finger to increase the blood flow. This may be done by *gently* squeezing the finger from hand to fingertip 5 or 6 times. Do not overuse this maneuver as it may cause erroneous results due to concentration of tissue fluids.
d) Cleanse fingertip with 70% isopropyl alcohol.
e) Wipe dry with a clean, dry piece of gauze or cotton.
f) Be sure that the finger is thoroughly dry, as blood will not well up and form a drop at the puncture site of a moist finger.
g) If you are using a lancet, remove the lancet from its package and grasp the lancet between the thumb and forefinger.
h) If you are using a finger puncture device, you will need to refer to the instructions for the device you are using.
i) Using a sterile lancet, make a skin puncture just off the center of the finger pad.
j) The puncture should be made perpendicular to the ridges of the fingerprint so that the drop of blood does not run down the ridges



15.10.5 Finger stick Method Using a Retractable Lancet

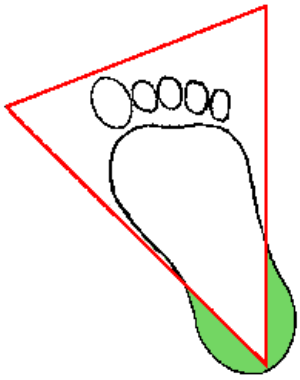
k) Wipe away the first drop of blood, which tends to contain excess tissue fluid.
l) Collect drops of blood by gently massaging the finger. Avoid excessive pressure that may squeeze tissue fluid into the drop of blood

15.11 Heel prick on Babies

15.11.1 Preparation of the patient

a) Pre-warming the infant's heel (42^{o}C for 3 to 5 minutes)
b) Clean the site to be punctured with an alcohol sponge.
c) Dry the cleaned area with a dry cotton.

The recommended location for blood collection on a newborn baby or infant is the heel. The diagram below indicates in green the proper area to use for heel punctures for blood collection



15.11.3 Heel prick procedure

a) Hold the baby's foot firmly to avoid sudden movement.
b) Using a sterile blood lancet, puncture the side of the heel. Do not use the central portion of the heel because you might injure the underlying bone, which is close to the skin surface.
c) Do not use a previous puncture site.
d) Make the cut across the heel prick lines so that a drop of blood can well up and not run down along the lines.
e) Wipe away the first drop of blood with a piece of clean, dry cotton.
f) Since newborns do not often bleed immediately, use gentle pressure to produce a rounded drop of blood.
g) Do not use excessive pressure or heavy massaging because the blood may become diluted with tissue fluid.
h) Fill the capillary tube(s) or micro collection device(s) as needed.
i) When finished, elevate the heel, place a piece of clean, dry cotton on the puncture site, and hold it in place until the bleeding has stopped.
j) Be sure to dispose of the lancet in the appropriate sharps container.
k) Dispose of contaminated materials in appropriate waste receptacles.
l) Remove your gloves and wash your hands.

16 Urine Collections

Laboratory examinations requiring urine samples involve a wide variety of procedures. A basic urinalysis is almost always included in the routine examination of patients. When a urine culture or a more esoteric urine examination is ordered, the clinical usefulness of the examination results can be ensured only if the patient receives explicit written instructions.

16.1 Random Sample Early / First Morning Urine

This is the most ideal sample for urinalysis since it has high concentrations of analytes and cells of interest. Before going to sleep, a patient empties their bladder and collects the first urine when they wake up in the morning. If the patient wakes up during the night to pass urine, they should also collect that urine and refrigerate it then collect their first morning urine in the same container. To accommodate patients with unusual sleep patterns, e.g. insomnia patients or night shift workers, an 8-hour urine period might be collected as above using the 8 hour period that the patient sleeps

1. The first portion of urine should be voided into the toilet.

2. The subsequent midstream urine should be voided directly into the sterile container.

3. The last part of the urine should be voided into the toilet.

Tightly close the container

16.2 24-Hour Urine

16.2.1 Procedure for 24 hour collection

Do not add anything but urine to the container.

Do not pour out any liquid or powder that may already be in the collection container.

The collection bottle may contains acid ingredient, (this acid can cause burns on contact. So container should be kept upright at all times and to avoid spillage)

The collection container should be kept refrigerated throughout the collection period.

The contents of the bottle might have a slight odour if there is a preservative– this is normal.

16.2.1.1 Instruction on collection:

1. You will be required to collect all urine passed over a period of 24 hours – therefore plan your day around a venue where this will be possible.
2. Choose a time to start the urine collection e.g. 06h00 – at this time completely empty your bladder into the toilet.
3. Write down the starting time of the collection
4. Thereafter every sample is to be collected and poured into the container given to you by the laboratory.
5. Use a clean jug as a collection container and empty this into the specimen bottle.
6. Maintain your normal level of hydration during this period by taking sufficient fluid but avoid those listed at the top of this instruction sheet.
7. Complete the collection period 24 hours after starting i.e. 06h00 – at this time empty your bladder for the last time and add this to the specimen bottle.
8. Write down the time of the last collection
9. Return the 24 hour collection to the laboratory

16.3 Midstream 'clean catch' Urine

This is the preferred sample when bacterial culture will be performed. The collection of this sample is dependent on proper patient education or instruction. The detailed instructions for collection of this sample follow below

16.3.1 Midstream 'clean catch' Urine Procedure for Female Patients

a) Wash hands with soap and water.
b) Wash the external genitalia with clean water using front to back sweeping movements.
c) Use two fingers of one hand to separate the vaginal lips (labia) and expose the urethral opening.
d) Void the first part of your urine into the toilet.
e) Hold the clean dry urine container in your other hand and pass it under the stream of urine to collect urine until the container is half full.
f) Pass the rest of your urine into the toilet.
g) Screw on the cap of the urine container and label with your name, the date and time of collection.

h) Wash your hands with soap and water.

16.3.2 Procedure for Midstream 'clean catch' Urine for Male Patients

a) Wash hands with soap and water.
b) Retract the foreskin and wash the head of the penis (glans) with clean water.
c) With the foreskin retracted, void the first part of your urine into the toilet. Hold the clean dry urine container in your other hand and pass it under the stream of urine to collect urine until the container is half full.
d) Pass the rest of your urine into the toilet.
e) Screw on the cap of the urine container and label with your name, the date and time of collection.
f) Wash your hands with soap and water

16.3.3 Procedure for Straight Catheter

a) Thoroughly cleanse the urethral opening with soap and water.
b) Rinse the area with gauze pads.
c) Aseptically insert catheter into bladder.
d) After allowing approximately 15ml to pass, collect urine to be submitted in a sterile screw-cap container.

Note: that catheterisation may introduce urethral flora into the bladder and increase risk of iatrogenic infection.

16.3.4 Procedure for Indwelling Catheter

a) Disinfect catheter collection port with 70% alcohol.
b) Use needle and syringe to aseptically collect 10-15ml of urine
c) Transfer to a sterile screw-cap sample bottle.

Note: That patient with indwelling catheters always have bacteria in their bladders. Do not collect urine from these patients unless they are symptomatic.

16.3.5 Procedure for Suprapubic Urine

This procedure is used in paediatrics or when otherwise indicated in adult patients. Due to its invasive nature, the procedure is used when less-invasive techniques cannot be used. The clinical procedure guidelines for suprapubic urine collection must be referred to for this procedure.

16.4 Preservatives and special instructions for urine collections

INVESTIGATION:	PRESERVATIVE:
Free Cortisol	Refrigerate +10g Boric Acid
Amylase	Refrigerate plain
Creatinine clearance	Refrigerate plain + Serum Creatinine
Creatinine and protein	Refrigerate plain
Urea and electrolytes	refrigerate plain

Sodium and potassium	Refrigerate plain
Protein	Refrigerate plain
Citrate	Refrigerate plain
Uric Acid	Not refrigerated plain
Metanephrine/Catecholamines (*diet and medication)	20ml 32% HCL
VMA diet and medication	20ml 32% HCL
Oxalate	20ml 32% HCL
Phosphorous	20ml 32% HCL
5H1AA (diet and medication)	20ml 32% HCL
Porphyrines (may also be random)	Refrigerate plain
May also be random	No preservative
Hydroxyproline diet	20ml Toluene
NB: Child + adult-age, height, weight	
Uric acid and calcium and diet	can be done together in plain bottle.
Koch's (TB)	Plain bottle (label "TB CULTURE")

16.5 Special Requirements for Urine collections

Follow special diet to be followed prior to collection of 24-Hour Urine Samples.

* Record all the medication that the patient is on.
* Patient not to discontinue medication.
* Inform the Pathologist if the instructions on the diet and medication were not followed.

VANILLA FREE DIET:

Preparation for 24 hour urine **HVA**, **VMA** and **5HIAA** test – Vanilla free diet.
The following must be excluded from the diet:

Bananas	Avocado
Pineapple	Egg plant
Ice Cream	Plums
Cheese	Walnuts
Puddings	Wines
Preserved Meats	Tomatoes
Coffee/Tea	Preserved meat
Cakes	Sweets
Yeast and Products	Cocoa
Biscuits	Sanatogen
Alcohol	Chocolates

The above diet should be followed for 4 days.
The urine collection must start on day 5 and continue for 24 hours.

Note: Sample is be collected in a receptacle containing 20ml of 32% HCL (Hydrochloric acid).

LOW CALCIUM DIET:

This diet is to be followed strictly for 7 days.

AVOID:

Cheese	Milk & Milk products
Tinned fish	Yoghurt

Antacids/medicines containing Calcium.

HYDROXYPROLINE:

- Obtain age, height and weight.
- Collagen free or low collagen diet for 4 days prior to collection of sample.

AVOID:

Meat products	Meat
Fish	Poultry
Meat extracts	Soup
Soup concentrates	Gravy
Puddings	Ice Cream
Soft candy	any other products containing gelatine.

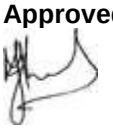
Above May Be Replaced By:

Cheese	Eggs
Dairy products Beans	
Pea's	Vegetable soups

17 Sputum Collection

Approximately 40% of sputum samples submitted for routine bacterial culture are rejected based on specimen quality. The quality of sputum specimens for all types of culture (bacterial, fungal and mycobacterial) may be improved by using the following collection guidelines.

- Drink plenty of fluids the night before collection
- Sit upright to collect sputum of the first cough in the morning
- Rinse your mouth with water, but do brush your teeth or use mouthwash before collecting sputum
- Print your name on the specimen container
- Unscrew the lid of the container
- Cough deeply to expectorate sputum directly into the container, do not contaminate the rim of the container with sputum
- Do Not expectorate any saliva or postnasal discharge
- **WRITE THE DATE AND TIME OF COLLECTION ON THE CONTAINER**
- Put the container into a plastic bag and return each specimen collected to the laboratory as soon as possible before 10 am. **DO NOT REFRIGERATE**
- Call the laboratory if you have any questions.



18 Summary Guidelines for Microbiology Sample Collection

Sample Type	Collection Guidelines	Handling and Storage	Comments
Abscess/Wound	Remove surface exudate by wiping with sterile saline on 70% alcohol.		Tissue or fluid samples are preferable to swabs
A. Open	Aspirate if possible. Place fluid or tissue in sterile container. Syringes are acceptable if delivered promptly-**without needle.**	Room temperature	Sampling of the surface area may contaminate the sample with flora not involved in the infection.
B. Closed	**1.** Aspirate abscess wall material with needle and syringe **2.** Syringes are acceptable if delivered promptly-**without needle**	Room temperature	None
Superficial Wounds	Disinfect surface of the wound with 70% alcohol. Aspirate if possible. If swab is used, obtain at the time of incision, drainage or debridement of wound**.**	Room temperature	Sampling of the surface area may contaminate the sample with normal flora not involved in the infection.
Biopsy/Bone/Tissue	Submit in sterile container without formalin. Sample may be kept moist with 0.85% sterile saline.	Room temperature	None
Sterile Body Fluids (Abdominal, Ascites, Bile, Synovial, pleural, Pericardial, Peritoneal)	1. Disinfect overlying skin with iodine tincture 2. Generally, samples are obtained via percutaneous needles aspiration or surgery 3. Transfer fluid to sterile container or blood culture bottles with syringe.	Room temperature	Fluid samples are preferable to swabs dipped in fluid.
CSF	Generally, doctors obtain these samples	Room temperature	None
Blood Cultures	Aseptic techniques are critical to proper blood culture collection. Clean venepuncture site with 70% alcohol then with iodine. 8-10ml in adults, 1-3ml in children is the minimum amount for each episode.	Room temperature	None
Respiratory Tract (Upper)			
A. Nasal Swab	1. Insert swab into nares 2. Rotate swab against the nasal mucosa	Room temperature	None
B. Oral	1. Remove oral secretions or debris	Room temperature	None

	form the surface of the infected area with a swab and discard. 2. Using the appropriate swab for the tests (please refer below for the correct swab), sample the site vigorously, avoiding areas of normal tissue. **Test** **Swab** Bacterial/fungal Routine Culture Swab Viral Viral culture media	Room temperature	None
C. Throat	1. Depress tongue with a sterile tongue depressor 2. Firmly sample inflamed area, exudate and/or lesions with the appropriate swab for the test (Refer below). **Test** **Swab** Bacterial/fungal Routine Culture Swab Viral Viral culture media	Room temperature	None
Respiratory Tract Lower			
A. Sputum expectorated	1. Instruct patient to gargle or rinse mouth with water 2. Instruct patient to cough deeply to produce a sample from the lower respiratory tract and not saliva. 3. Collect sample into a sterile container.	Room temperature	Sample must be brought to the laboratory as soon as possible after collection. Sample will be evaluated for contamination with saliva
B. Tracheal Aspirate	Place aspirate or washing into a sterile container.	Room temperature	None
Skin Scrapings	1. Cleanse the area with 70% alcohol 2. Scrape area at the active margin of the lesion. Do not draw blood. 3. Place scrapings into a sterile container.	Room temperature	None
Nail	1. Wipe nail with 70% alcohol. 2. Clip away the affected areas and collect material or debris for under the nail. 3. Submit sample in a sterile container.	Room temperature	None
Gastrointestinal Tract			
A. Faecal Samples	1. Pass stool directly into a sterile or		None

	clean, wide mouth, leak proof container. 2. Pass stool into clean, fry bedpan and transfer to container. 3. Cover toilet seat with plastic wrap and transfer to a clean or sterile container. Please refer below for the appropriate container for the test: **Test** **Swab** Bacterial/fungal Clean/sterile Container Viral media Viral culture Rotavirus Clean/sterile Container	Room temperature. Refrigerate	None
B. Rectal Swabs	1. Pass the tip of a sterile swab approximately one inch beyond the anal sphincter. 2. Carefully rotate the swab to sample the anal crypts, and then withdraw the swab.	Room temperature. Refrigerate	None

19 CYTOPATHOLOGY COLLECTION

Samples to be collected only by the doctor.

19.2 Common types of samples submitted to Cytology;

- Cervico-vaginal smears (PAP smear)
- Body fluids e.g. CSF, Pleural, ascitic, urine etc.
- Sputum
- Bronchial samples- these are bronchial lavages and bronchial brushings.
- Fine Needle Aspiration samples from superficial lesions, deep seated (intracavity) lesions or abscesses.

19.3 General Precautions When Collecting Cytology Samples

a) Do not use a lubricant on the instruments or gloves
b) Do not use talcum powder on the gloves
c) Do not permit the cells to dry while trying to spread them perfectly on the slide.
d) Do not take the smear after performing biopsy.
e) Avoid any unnecessary trauma to the tissue to be sample. The presence of excess blood will render interpretation of the smear difficult by masking or diluting the epithelial cells.
f) A well filled request form is mandatory including relevant previous biopsies, diagnoses, treatment, medication etc. for beneficial interpretation of the smear

19.4 PAP and Vault Smear Collection Technique

a) Label the frosted end of the slide with the patient's name using a pencil. **Do not use ink or ballpoint pen:** as the writing becomes blurred and /or removed during staining.
b) Complete the gynecology (GYN) Cytology Request and Report form fully.
c) Ensure that the cytological request form contains all the required information.
d) With the aid of a speculum, expose the uterine cervix to view and identify the cervical OS. Satisfactory smear collection requires direct observation of the cervix
e) Examine the cervix for its appearance.
f) If there is a mucus or pus plug, remove it with the aid of a high vaginal swab with extra cotton wool on it.
g) Insert the central bristles of the brush in to the cervical canal and use gentle pressure until the lateral bristles bend against the ectocervix.
h) Maintain the pressure as cautioned and rotate the cervix brush 5X in a clockwise direction by rolling the stem between thumb and fore finger.
i) Transfer the sample to the labelled microscopic slide with a painting action, applying first one side of the bristles and then the other side.
j) Immediately spray the fixative to the slide, maintaining approximately 30cm (12 inches) distance between the slide and the spray bottle.
k) Place the slide on the slide folder and leave to air dry before transporting to a cytology laboratory.

19.5 Transporting of PAP smears to laboratory

1. The LABELED PAP smears must be submitted to the laboratory in appropriate LABELLED slide containers which
- Should have means of staying closed e.g. a rubber band placed around the slide holder.
- Can be easily opened
- Prevent the slide surface from coming in contact with the lid.
2. Upon receipt in the laboratory the number of slides received labeled with the patient's details and date of receipt should be noted.
3. The requisition form should also have the following patient details
- Name in full
- Date of Birth or age
- Last menstrual Period or Hormonal state
- If any, form of contraception.
- Appearance of the cervix

20 Histopathology

This section is concerned with the examination of tissue samples that are obtained either surgically in the operative theatre and clinics or at autopsy, for the purpose of diagnosis of diseases. The tissue samples are processed in that manner as to finally produce stained sections which allow microscopic examination to determine cellular pattern in the diagnosis of diseases by the pathologist.

20.1 General instructions

Obtain 10% formalin and sample containers of various sizes from Histology laboratory.

Tissues must be submitted totally submerged in 10% formalin. The ratio of tissue to fixative should be 10:1. The container should be large enough to accommodate this.

If need arises the sample may be sliced. This should be a few slices as possible and should be complete slices to preserve the anatomical configuration of the sample as much as possible.

A *Histopathology Request and Report form* must be completed and the A request form or an electronic request where applicable must accompany all samples detailing the clinical diagnosis, relevant history and operative findings.

Completion of the Histopathology Request

21 Disposal of Healthcare waste.

Healthcare waste is a byproduct of healthcare that includes sharps, non-sharps, blood, body parts, chemicals and medical devices (equipment used in the collection of specimens e.g. gloves, spatulas, needle holders etc.)

All Healthcare waste is to be disposed of as per National regulations.

22 Critical Values (adapted from Tietz Textbook of Clinical Chemistry 3rd Edition

	Lower Limit	Upper limit
Bilirubin, Total (ages 0-1 yr.)		239 umol/L
Urea		32 mmol/L
Calcium (CA)	1.75 mmol/L	3.25 mmol/L
Carbon Dioxide (CO2)	10 mmol/L	45 mmol/L
(Ages 0-2 yr.)	10 mmol/L	40 mmol/L
Chloride (CL)	75 mmol/L	125 mmol/
Fibrinogen	50 mg/dl	
Glucose Adults	2.8 mmol/L	24.95 mmol/L
(Ages 0-4 yr.)	2.0 mmol/L	22 mmol/L
Hemoglobin		
Ages 1 mo.-adult	6.0 g/dL	20.0 g/dL
Ages 0 – 1 month	10.0 g/dL	21 g/dL
IgA - Cord Blood		>11 mg/dl
IgM - Cord Blood		>25 mg/dl
Ionized Calcium (ICAL)	0.85 mmol/L	1.50 mmol/L
(Ages 0-6 months)	0.95 mmol/L	1.65 mmol/L
Lead, Blood		69 ug/dl
Lithium (LI)		2.0 mmol/L (Toxic Range)
Magnesium (MG)	0.4 mmol/L	2.0 mmol/l

Osmolality (OSMO)	250 mOsm/kg	350 mOsm/kg
Partial Thromboplastin Time (PTT)		100 seconds
Platelets	40 x 10^3	1000 x 10^3
Potassium (K) (serum or plasma)	2.8 mmol/L	6.2 mmol/L
Prothrombin Time		>5.0 INR
Sodium (NA)	120 mmol/L	160 mmol/L
WBC (White Blood Cell Count)	1.5 x 10^3	30 x 10^3
Urinalysis		RBC casts
Cerebrospinal Fluid neonates		> 30 cells per u/L
> 3 months		>5 cells per u/L
malignant cells	Any	

23 Acceptance and Rejection Criteria

To ensure quality testing, it is important to adhere to the following general guidelines when collecting and transporting samples. Once a sample is collected properly, it must be transported, processed and stored correctly, otherwise results may be compromised. All samples sent to the laboratory must meet the acceptance criteria below:

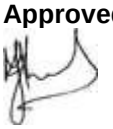
23.1 Acceptance Criteria

Every sample submitted to a DML must be accompanied by a properly completed request form. These request forms are available from any DML laboratory, branch or depot

23.2 Rejection Criteria

The laboratory reserves the right to reject samples that do not meet a set criteria below:

- Inadequately labeled samples and forms.
- Use of expired samples containers
- Wrong sample container or samples type
- Unlabeled samples
- Mislabeled samples (patient identifiers on samples and forms not corresponding)
- Insufficient quantities (refer to the defined specific volume requirements)
- Samples subjected to extensive delay or extreme temperatures
- Compromised samples, e.g.
    - Bacterial / fungal contamination
    - Hemolysed
    - Lipemic
    - Clotted
    - Autolysed
- Samples transported unsafely e.g. samples in gloves or sent by hand



- Leaking or broken samples container
- Refer to the defined specific requirements for each test
- All rejected samples will be retained by the laboratory, the concerned requestor will be informed by telephone (for electronic request only), by way of Patient Test Report stating examination rejected and reason

24 Patient Instructions

IMPORTANT: For accurate test results, please read all directions first and follow them carefully.

24.1 Patient Instruction for Glucose Tolerance Test

The GTT takes two and a half hours during which the patient must remain seated in the nurse's reception.

There is no eating or smoking during the test, only water may be drunk.

1. At least 3 days of unrestricted diet (> 150 g carbohydrate daily) and usual physical activity prior to testing.
2. The night before the test have a carbohydrate (30 –50 g) rich meal.
3. Do not eat or drink anything after 8pm; only water may be drunk if thirsty.
4. Come to the laboratory first thing in the morning

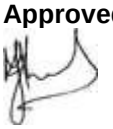
24.2 Patient Instruction for random urine collection

1. The first portion of urine should be voided into the toilet.
2. The subsequent midstream urine should be voided directly into the sterile container.
3. The last part of the urine should be voided into the toilet.
4. Tightly close the container**.**

24.3 Patient instruction on 24 hour urine collection

Useful Information:
Do not add anything but urine to the container.
Do not pour out any liquid or powder that may already be in the collection container.
The collection bottle may contains acid ingredient, (this acid can cause burns on contact. So container should be kept upright at all times and to avoid spillage)
The collection container should be kept refrigerated throughout the collection period.
The contents of the bottle might have a slight odour if there is a preservative– this is normal.

1. You will be required to collect all urine passed over a period of 24 hours – therefore plan your day around a venue where this will be possible.
2. Choose a time to start the urine collection e.g. 06h00 – at this time completely empty your bladder into the toilet.



3. Write down the starting time of the collection
4. Thereafter every sample is to be collected and poured into the container given to you by the laboratory.
5. Use a clean jug as a collection container and empty this into the specimen bottle.
6. Maintain your normal level of hydration during this period by taking sufficient fluid but avoid those listed at the top of this instruction sheet.
7. Complete the collection period 24 hours after starting i.e. 06h00 – at this time empty your bladder for the last time and add this to the specimen bottle.
8. Write down the time of the last collection
9. Return the 24 hour collection to the laboratory

24.4 Patient Instruction on Stool for Occult Blood

1. Please **OMIT** the following from your diet for **3 days** prior to producing the specimen:
   - Red Wine.
   - Spinach.
   - Beetroot.
   - Any red meat
   - Vitamins/tonics that contain Iron.
   - Beef stock cube and beef soup.
2. Collect sample in a clean container
3. Return the specimen to the laboratory within **48 hours** of collection.

24.5 Patient Instruction on Stool Collection for Culture, Microscopy, Rotavirus, Adenovirus

1. Collect stool into a clean, dry container
2. If the stool is formed: add a small piece of stool into the container.
3. If present, select watery, bloody or slimy portions of the stool using the attached collection spoon. Place enough specimens into the container. To ensure adequate sampling of formed stool, sample portions of the side middle and end of bolus.
4. If the stool is liquid: add enough stool into the container to cover the bottom of the container with a ¼ inch of stool.
5. Tighten the cap of the container and Refrigerate.
6. Write the patient's name, date and time the stool was collected on the label
7. Return to the laboratory within 48 hours of collection.

24.6 Patient Instructions for Sputum Collection

Approximately 40% of sputum samples submitted for routine bacterial culture are rejected based on specimen quality. The quality of sputum specimens for all types of culture (bacterial, fungal and mycobacterial) may be improved by using the following collection guidelines.

- Drink plenty of fluids the night before collection
- Sit upright to collect sputum of the first cough in the morning
- Rinse your mouth with water, but do brush your teeth or use mouthwash before collecting sputum
- Print your name on the specimen container
- Unscrew the lid of the container
- Cough deeply to expectorate sputum directly into the container, do not contaminate the rim of the container with sputum
- Do Not expectorate any saliva or postnasal discharge

- **WRITE THE DATE AND TIME OF COLLECTION ON THE CONTAINER**
- Put the container into a plastic bag and return each specimen collected to the laboratory as soon as possible before 10 am. **DO NOT REFRIGERATE**
- Call the laboratory if you have any questions.

24.7 Patient Instruction on Semen Collection

1. The semen specimen may be collected by means of masturbation, provided a clean, dry container is used and the entire specimen is collected.
2. When fertility potential is to be studied, note the date and time that the specimen was collected.
3. If collected at home, bring the specimen to the Main Laboratory within one hour of collection and to be sure the name must be clearly marked on the container.
4. Keep the specimen as close to body temperature as possible
5. Collecting the semen specimen using the withdrawal method is not acceptable as some of the semen can be released before ejaculation.
6. The use of condoms is also not encouraged as some of the condoms contain chemicals that are spermicidal.

25 Laboratory Results Policy

The results of each examination are reported accurately, clearly, unambiguously and in accordance with any specific instructions in the examination procedures.

26 Delivery of reports

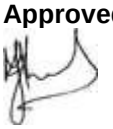
a) Distribute reports via the couriers to authorized personnel.
b) Electronic reports for doctors who have email addresses inputted into the LIMS the final result are emailed as soon as they are reviewed.

27 Complaint procedure

This procedure ensures that complaints are fully resolved to the satisfaction of the complainant and that feedback is used for the continual improvement of the system.

a) Complaints can be received via the following means

- in writing,
- electronically through e-mail,
- by telephone,
- in person,



- suggestion box,
- Customer survey.