

**VAIOLA HOSPITAL
LABORATORY SERVICES**

2002

LABORATORY HANDBOOK

Phone: 23-200; Ext. 336 all enquiries

Ext. 376 Biochemistry Section

Ext. 379 Blood Transfusion Section

Ext. 339 Haematology Section

Ext. 377 Microbiology Section

Ext. 345 SMO in charge

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1. Introduction

This laboratory Users handbook describes the tests and procedures performed by the laboratory services at Vaiola Hospital.

Its production is part of a team effort by the different sections of the Laboratory Services in trying to achieve its mission which is generally aimed at satisfying its customers through the provision of quality and cost-effective laboratory services in all areas.

Although it is mainly intended to be used by clinicians at Vaiola Hospital; doctors holding posts at hospitals in outlying island stations should find it helpful too.

We hope to update this handbook on a regular basis in future. Suggestions on how to improve its clinical usefulness or to correct errors and omissions will be welcomed and they should be addressed in writing to the SMO in charge of the Laboratory Services.

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Dr. Siale 'Akau'ola
SMO – Laboratory Services
January 2002

2. Laboratory Organisation and Procedures

2.1 Mission Statement

The laboratory services section seeks to satisfy its customers through the provision of high quality, cost-effective services in all areas, and the standards of services provided should comply with or exceed all widely accepted ethical and professional principles, as embodied in any accreditation criteria that may at some time apply in Tonga.

The laboratory section's mission statement was produced in conformity with the four main core-values of the Ministry of Health, which are:

- a) commitment to quality
- b) professionalism and accountability
- c) care and compassion
- d) commitment to education and training

2.2 Objectives of the Laboratory Services

- To comply with the laws and statutes of the Kingdom of Tonga that may from time to time be applicable.
- To hold current accreditation when available
- To use comprehensive Quality Control, checking and authorization systems to ensure validity of results and services.
- To ensure timely results, information and products which meet the requirement of customers.
- To create and maintain a working environment which is safe and conducive to maintaining the interest and motivation of staff.
- To use every problem identified as an opportunity for improvement.
- To sustain good interpersonal communications to ensure an integrated team approach
- To provide staff with opportunities for self development and involvement in decision making.

2.3 Hours of Duty

The laboratory is open during normal working hours, Monday to Friday, from 8.30am to 4.30pm. Outside this period, the laboratory operates an emergency service to cater for urgent requests from clinicians. This special service is run for 24 hours a day; seven days a week.

Clinicians are urged to take note that due to staff shortage, only one technician is on duty all the time at the laboratory, to coordinate the activities required to carry out this emergency service. These activities include the provision of urgent Blood Transfusion and Haematology services and the processing of all urgent laboratory samples received outside normal working hours.

Occasionally, the workload may be too much for the lone technician on duty and other technicians may be called to undertake, other specific tests, especially in biochemistry, microbiology or histology and cytology.

During the "after-hour" period, clinicians are reminded, please, to request an urgent laboratory test, only when necessary and the result of such a test will have a significant beneficial effect on the management of the patient. Routine laboratory tests should never be requested to be carried out after the normal working hours.

During the normal working hours, on the other hand, all routine and urgent laboratory tests are carried out by the laboratory. To facilitate the processing of samples and to improve the turn around time of results; clinicians are urged to send all samples requesting for routine tests, to the laboratory, preferably before 12.00 mid-day for biochemistry, and not later than 3.00pm for other sections, during normal working hours.

2.4 Specimen Collection Guidelines:

- a) Labelling:

Request forms should have the following minimal information:

- Patient's full name (surname and first name) and Address.
- Hospital Number
- Sex and date of birth. DO NOT WRITE "A" or 'Adult' for the age!!
- Nature of specimen and date of collection
- Test requested
- Relevant clinical information
- Signature and name of doctor requesting the test

All specimens must have the following, clearly written:

- Name of patient (surname and first name)
- Date of birth of patient
- Date specimen collected
- Nature of specimen (except in cases where it is clearly a blood collecting container, there will not be any need to write blood). Unless, of course, if an "effusion" is collected, into a blood container – then one must write the type of "effusion" on the specimen container's label.

DO NOT LABEL ON THE LID OF THE SPECIMEN CONTAINER. WRITE ON THE SIDE.

Please note that inadequately labelled or unlabelled samples will not be analysed. Such problems are documented and reported to the in charge of the Laboratory Services.

b) Specimen Containers:

- Urine/stool/sputum containers – available at Laboratory registration area.
- Blood Tubes - available at Haematology. – plain, EDTA and fluoride tubes for blood sugar.
- Blood Culture - available at Microbiology
- Histopathology specimen - The histology and cytology section have limited plastic containers only. The operating theatre staff sometimes provide containers too. Formalin is available from Histopathology area.
- For Cytology requirements, please contact the Histopathology/Cytology Section.

c) Blood Collection Service: (Venepuncture service).

- Because of our limited number of staff, we cannot provide a routine ward, blood collection service. Ward staff are expected to collect specimens and transport them to the Laboratory Reception area during working hours; except for blood transfusion specimen; these can be sent to the Blood transfusion, directly, during this period (8.30am – 4.30pm).
- Routine specimens from the wards should arrive at the Laboratory reception area, preferably before 12 mid day and definitely not after 3.00pm during normal working hours, to allow adequate specimen processing.
- An Outpatient service is provided in the laboratory during normal working hours. However, during the after-hour period, Laboratory outpatient will only collect urgent blood samples of patients to be admitted to the Ward or those urgents requested by doctors. Routine blood samples will not be taken by the Laboratory outpatient staff after hours. Please note that only one technician is normally on duty after hours who can be available to perform venepuncture. Clinicians may be requested to collect their own blood samples especially if the technician is busy in other urgent activities.
- Children less than 3 years of age will normally have their blood collected by the paediatric staff or doctor, and not by the laboratory outpatient.
- After hours specimen sent to the laboratory will have to be put in the labelled area in the Haematology Laboratory. In cases of very urgent specimens, the technician on duty must be informed when the specimen arrives in the laboratory. Routine specimen received after hours will

only be processed if the workload allows. Otherwise, it will be processed the next morning. Again, clinicians are reminded please to use the after hours laboratory services, only for emergency cases.

d) Disposal of Specimen

Prior to disposal of any specimen, the doctor concerned will always be notified by the laboratory first.

- Incorrectly collected or labelled Specimens:

- Laboratory staff receiving such specimen will immediately notify the person who collected specimen that Laboratory will NOT process such specimen unless labelling requirements are met.
- Whoever collected the specimen must complete the labelling requirement in the laboratory within 30minutes otherwise, specimen will be discarded.
- Haemolysed specimen will be discarded.
- Saliva instead of sputum is discarded
- Specimen collected in the wrong container is discarded
- Specimen difficult to recollect, eg. microbiology, cytology, histology, CSF, neonatal ones; will not be discarded unless a clear discussion between the doctor concerned and a senior laboratory staff is made.

2.5 Results:

- Unexpected and markedly abnormal results are routinely phoned to the clinician concerned.
- Urgent requests are also phoned if specifically requested for; by writing on the request form, or by direct phoning.
- Otherwise, results will be available at the registration area of the laboratory as soon as they are ready.
- On rare occasions, we may deliver the results if staff are freely available to do this work. But please, do not depend on this too much because sometimes, especially after hours, the technician on duty may be too busy with other urgent things, to do the delivering job.
- Please note that results go into envelopes with addresses matching those specified on request forms. Once they are picked up, say by a specific ward; then it is the responsibility of each clinician to pick his/her results from that ward.
- If doctors prefer to pick up their own results themselves; please let us know so that we can leave aside a specific envelope for you here in the laboratory; where your own results can be collected and later picked up by yourself.
- The laboratory services regrets any inconveniences with this current arrangement but we can only operate within the limited resources available.

2.6 Customer Feedback and Complaints

You clinicians are the treasured customers of this laboratory and you are most welcome to send us feed backs, complaints and criticism of the services we provide. Tabulated below are the nature of the complaint/feed back and who it should be directed to.

Nature of Complaint	Person/s the Complaint should be referred to:
Minor (eg. need another copy of laboratory result)	Laboratory section concerned (specific technician)
Serious (verbal or written complaint) eg. wrong blood bag unit issued.	- SMO i/c Laboratory Services - QC Officer - Principal Microbiologist
Major incidents (eg. fire in the laboratory)	- SMO i/c Laboratory Services - QC Officer - Medical Superintendent

3. **Biochemistry Service**

3.1 **Telephone Numbers:**

Lab. enquiries - 336
Charge scientist - 376

3.2 **Working Hours**

Routine Operation: Mondays - Fridays
08.30 - 1630

After hours

Urgent biochemistry requests made outside normal working hours are handled by a specific technician who is on call from home and will have to be picked up by the hospital transport to come and do such tests.

This arrangement is necessary since the other one technician on full time duty at the laboratory during this period usually has enough workload looking after haematology, blood transfusion, lab. outpatient and the processing of all urgent incoming requests.

After hours tests available:

- Urea
- Electrolytes, Potassium and Sodium
- Blood glucose

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- C.S.F. protein, glucose
- Serum bilirubin for neonates only
- Creatinine

Other biochemistry tests can be carried out too but special arrangements will have to be made with the charge technician first.

3.3 **Specimen Delivery**

All specimen should be delivered to the reception desk to be stamped with date and time.

Specimen received after-hours should be delivered to the technician on duty or left at the designated place at Haematology. In the later case, the technician on duty must also be notified to be a ware of the specimen.

Specimens requesting for tests in emergency situations should preferrably be accompanied by a separate note from the clinician to alert the technician to the emergency nature of the situation. A phone call to the laboratory staff will also help a lot.

3.4 **Test Reports**

All Urgent requested results or unusual results will be phoned to the doctor/ward concerned.

Final test report can be collected from the reception area. When staff is available the laboratory tries to distribute laboratory results to the wards twice a day. Once at 10am and once at 4.00pm during normal working hours.

3.5 **Overseas Tests**

A list of tests send overseas is given on Section 9.2.

3.6 Tests and Specimen Requirements

Alanine Amino Transferase (ALT)

Specimen - 5ml blood, in plain tube (see Liver Function Test – LFT)
Reference range - F: 9–36 U/L, M: 9–43 U/L

Albumin

Specimen - 5ml blood in plain tube
Reference range - 34–48 g/L

Alkaline Phosphatase (ALP)

Specimen - 5ml blood in plain tube see Liver Function Test
Reference range - Adult: 35–110 U/L, Children: 110–360 U/L

Amylase (serum)

Specimen - 5ml plain tube
Reference range - < 109 U/L

Aspartate Aminotransferase (AST)

Specimen - 5ml blood in plain tube (see LFT)
Reference range - F: 10–31 U/L, M: 10–34 U/L

Bence Jones Protein, Urine

Specimen - Random urine (no preservative)
Reference range - Non detected

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Bilirubin

Specimen - 5ml blood in plain tube see LFT
Reference range - Total bilirubin 3.1–17.1 umol/l,
Direct bilirubin 0.8–5.1 umol/l

Blood Gases

Specimen - Arterial blood in heparinised syringe (Rapidlyte), mix well and transport to laboratory in ice bath immediately. Please notify the laboratory before any arterial blood for blood gases is collected.

Normal range - pH 7.37 - 7.42
PCO₂ 35 - 45 mmHg
PCO₂ 70 - 100mmHg

Calcium

Specimen - 5ml blood in plain tube
Reference range - 2.12–2.60 mmol/l

Cardiac enzymes

Specimen - 5ml blood in plain tube
Reference range - CK < 190 U/L
LDH: 100–220 U/L

Cerebrospinal fluid (CSF)

Specimen - 1 ml
Reference range - protein 150–450 mg/L
Sugar 2.4 - 4.4mmol/L

Cholesterol

Specimen - 5 ml blood in plain tube (Fasting Specimen)
Reference range - Total 3.8 – 5.2 mmol/L
HDL Chol. 1.0 – 2.5 mmol/L
LDL Chol. 2.0 – 3.5 mmol/L

Creatinine Kinase (CK)

Specimen - 5ml blood in plain tube (see Cardiac Enzymes)
Reference range - M < 190 U/L F < 165 U/L

Creatinine (serum)

Specimen - 5ml blood in plain tube
Reference range - F: 0.05 – 0.08mmol/L, M: 0.06 – 0.12 mmol/L

Creatinine, Urine

Specimen - 24 hr urine, no preservative
Reference range - 7 - 18mmol/24 hr

Creatinine Clearance

Specimen - 24 hour urine + blood sample taken within the 24 hr.
Reference range - 1.5 – 2.0ml/sec.

Electrolytes

Specimen - 5ml blood in plain tube
Reference range - Sodium: 135 – 150 mmol/L
Potassium: 3.4 – 5.0 mmol/L

Glucose (blood)

Specimen - 3ml blood in fluoride tube
Reference range - FBS: 3 – 6 mmol/L
RBS: 3.8 – 7.8 mmol/L

GTT and 50gm polycose screen (arrange with Lab.)

Gamma glutamyl transferase (GGT)

Specimen - see LFT; 5mls blood in plain tube
Reference range - F 7 – 32 U/L, M 11 – 50 U/L

Lactate dehydrogenase (LDH)

- see Cardiac Enzymes

Liver Function Tests

Specimen - 10ml blood in plain tube
Reference range - Total protein: 66 – 83 g/L
Albumin: 34 – 48 g/L
Total Bilirubin: 3.1 – 17.1 umol/L
Direct Bilirubin: 0.8 – 5.1 umol/L
ALP: adult - 35 – 110 U/L
Children - 110 – 360 U/L
ALT: F - 9 – 36 U/L
M - 9 – 43 U/L
GGT: F - 7 – 32 U/L
M - 11 – 50 U/L

Phosphate

Specimen - 5ml blood in plain tube
Reference range - adult: 0.8 – 1.55 mmol/L
Children: 1.3 – 2.1 mmol/L

Potassium (serum)

See electrolytes

Potassium, Urine

Specimen 24 hr urine or random, no preservative

Reference range - 25 – 100 mmol/24 hours

Pregnancy Test (urine)

Specimen - early morning urine

Remarks - Sensitivity of method is 20 Units HCG/L

Protein

See liver function test

Renal function Test (See, urea, creatinine and electrolytes)

Triglycerides

Specimen - 5ml blood in plain tube (fasting)

Reference range - 0.4 – 2.0 mmol/L

Urea : Specimen - 5ml blood in plain tube

Reference Range - 1.7 - 8.3 mmol/L

Uric acid

Specimen - 5ml blood in plain tube

Reference range - F: 0.14 – 0.34 mmol/L

M: 0.20 – 0.42 mmol/L

4. Blood Transfusion and Immunohaematology Services

4.1 Telephone numbers:

Enquiries - 379
Charge Scientist - 379

4.2 Working hours:

Normal laboratory working hours Mondays – Fridays (except holidays), 8:30am – 4.30pm.
After hours service - This section is covered 24 hours, 7 days a week by the duty technician, who should be contacted in urgent requests.

4.3 Introduction:

The Blood Transfusion and Immuno-haematology Service is responsible for two major activities:

- a) In conjunction with the Tonga Red Cross; it oversees the collection of blood from low risk donors, screening donated blood for Transfusion Transmissible Infections, blood grouping, antibody testing, cross matching, production of other needed blood products, storage and the issue of blood/blood products for clinical use.
- b) Testing of immunohaematological parameters that may be requested in relation to certain medical conditions of public health and/or clinical health significance.

More information regarding the blood transfusion service is available in the printed protocol for clinicians of the MOH; Titled: “The Clinical Use of Blood/Blood Products”.

4.4 Request for Blood/Blood products for Transfusion

Specimen required:- 5 – 10mls blood collected in a plain tube, together with a completed Blood Transfusion, Laboratory Request form, and send to the laboratory.

Special requirement in patient Sample Collection

The tube must be clearly and accurately labelled in ink, at the bed side and the patient from whom the blood was taken must be identified beyond doubt. The patient’s specimen must be accompanied by the appropriate Transfusion form, properly completed and signed by the ordering clinician. Please include in the clinical particulars any significant history, especially pregnancy, drugs that may cause haemolysis and if there was any earlier blood transfusion.

Generally, samples for cross matching must not be taken 72 hours prior to cross-matching as long as there has not been any blood transfusion during this time.

After transfusion, the laboratory keeps samples from the patient’s specimen and donor unit for a period of one week in case investigations of a Transfusion Reaction is undertaken.

4.5 Processing of donor units, storage and cross-matching procedures

These activities are carried out under strict quality controlled, approved standardised procedures which are documented both in the Blood Transfusion SOPs and the Laboratory’s Quality Manuals. They ensure that the blood units dispensed are safe and appropriate for each specific patient’s use.

4.6 Transfusion Therapy

Please refer to the booklet for Clinicians of the Ministry of Health, titled: “The Clinical use of Blood/Blood Products”. It has information on blood products available, transfusion procedures, adverse transfusion reactions, appropriate use of blood/blood products, blood ordering schedule in surgical procedures and so forth.

4.7 The Administration of Blood Transfusions

a) Clerical Aspects

THE MAJORITY OF TRANSFUSION ERRORS ARE OF A CLERICAL NATURE.

Common Sources of Error are:

- (i) Failure to identify recipient when blood sample for cross match is taken
- (ii) Failure to correctly label the recipient's blood sample
- (iii) Transcription errors within the laboratory
- (iv) Failure to identify the recipient prior to setting up the transfusion
- (v) Failure to positively establish that blood about to be transfused has in fact been cross-matched for that patient.

When a request for blood transfusion is made; it must be accompanied by correctly and completely labeled blood transfusion forms and specimen of the recipient's blood sample.

Ward staff should only send for blood from the blood bank when they are ready to infuse it. Blood units should never be kept in the ward refrigerator.

The laboratory must keep an accurate record of blood units, issued; At the same time, the person to whom the blood is issued should sign for it together with the laboratory staff.

The Blood Bank policies and protocols for issuing blood, especially visual checking of labels and appearance of the blood unit must be carefully followed.

The responsibility for the transfusion of the blood unit to the right patient is the clinician ordering the transfusion, unless proper documentation of any delegation of this responsibility is clearly made.

b) Setting up an infusion

Prior to setting up the infusion in the ward, the labels on the blood unit indicating a satisfactory compatibility testing must be re-checked with the recipient's identification. There must be no discrepancy. A signed record of this re-checking process must be made and the time and date of starting the transfusion be documented.

Using proper aseptic techniques, all blood and blood components for intravenous use must be given through an appropriate administration set with a filter. This set should be changed regularly, at least every 24 hours or after 4-6 units transfused. A solution compatible with blood should be used to flush the I.V. set before and after infusion. These actions are necessary in order to reduce the risk of contamination of IV line and subsequent infections.

Intravenous (I.V.) medication should not be added directly to the blood.

Rate of blood transfusion depends on clinical situation which warranted the transfusion. Most units can be transfused in 1 ½ - 2 hours in adults with symptomatic anaemia. It should not be transfused in more than 4 hours due to the risk of bacterial proliferation and haemolysis of blood, at room temperature.

Patients at risk of volume overload should be cautiously transfused and diuretics may be used immediately prior to transfusion to reduce this risk.

It is wise to do blood transfusions during the day time when more ward staff are available to monitor the process. After hours transfusion should only be carried out in real emergency situations.

A blood unit which is not used in the ward immediately, must be returned to the Blood Bank within 30 minutes of issuing.

c) Care during Transfusion

The staff responsible for the care during the transfusion of blood, must be well trained and is able to identify different adverse transfusion reactions and the appropriate actions to be taken when they occur. Careful observations within the first 5 – 10 minutes of transfusion is crucial since this is the time when most life-threatening adverse transfusion reactions occur, although possibility of adverse effects continues throughout and after the transfusion process.

(Please see the booklet on “The Clinical Use of Blood/Blood Products”, for further details).

d) Post Transfusion Care:

Observation of transfused patients should continue even after the transfusion process, in order to identify possible delayed transfusion reactions and investigated appropriately.

(again, please refer to booklet on “Clinical Use of Blood/Blood Products” for further informations on Adverse Transfusion reactions).

e) Transfusion reactions

Please refer to the booklet on “Clinical use of Blood/Blood Products”.

4.8 Immunohaematology

a) Blood Products

Whole Blood

Volume : 500ml

Indication : For major transfusions to increase red cell mass and blood volume

Red Cells, concentrated (packed cell) volume: 300ml

Indication : To increase red cell mass in moderate to severe symptomatic anaemia

Plasma (Fresh frozen) Vol. 200 – 250ml

Indications: For treatment of coagulation disorders such as deficiency in coagulation factors as seen in warfarin overdose, DIC and certain plasma protein abnormalities.

It should not be used as a plasma volume expander in the absence of above main indications.

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Platelet Concentrate ($> 4.5 \times 10^9$ platelets/unit)

Volume 50 to 60ml

Indication : Bleeding due to thrombocytopenia and some thrombocytopathies. Usually, 6 units supplied for adults. 1 unit per 10 to 12 kg.

b) Tests and Specimen Requirements

Antibody Screening

Specimen - 10ml blood in plain tube

Remarks - Please give diagnosis and details of previous Transfusions.

Blood Group (ABO/Rh)

Specimen - 10ml blood in plain tube

Cross Match

Specimen - 10ml plain, 3.5 ml EDTA

Complete proper Blood Transfusion form and please be extra careful with labeling of patient sample.

Direct Coomb's Test (DCT)

Specimen - 5mls blood in EDTA tube.

Group and hold serum

Specimen - 10ml blood in plain tube

HBsAg

Specimen - 10ml blood in plain tube

HCV

Specimen - 10ml blood in plain tube

(hepatitis C Virus antibody)

HIV

Specimen - 10ml blood in plain tube

RPR (Syphilis)

Specimen - 10ml blood in plain tube

Please note, that any requested combinations of the HBsAg, HCV, HIV and RPR tests can be done on the same 10mls blood in plain tube, specimen.

At the Blood Bank, the HBsAg, HIV and RPR screening tests are normally performed on all donated blood units, to ensure that they are negative, before being transfused. Due to limited resources, the HCV test is carried out only on blood units to be transfused to children, less than 12 years old, and in adults on special requests.

5. HAEMATOLOGY

5.1 Telephone Number

Extension: 339

Senior Technician in charge - 339

5.2 Working Hours

- Normal working hours 8:30am – 4:30pm, Mondays – Fridays except holidays .
- All routine tests should be requested before 3:00pm during normal working hours.
- After-hours are covered 24 hours a day, 7 days a week for emergency requests only. Please note that due to staff shortage, routine requests will normally not be processed after hours.

5.3 Haematology Tests

Activated Partial Thromboplastin Time (APTT)

- Specimen - 4.5ml blood citrate tube
- Reference range - 25 – 38secs (Therapeutic range of heparin 48 – 90secs).
Please notify the laboratory before any coagulation test is requested
- Remarks - Specimen must arrive in the laboratory within 60 minutes of being taken.

Bleeding Time - carried out by Laboratory staff at bed side. Please notify the laboratory when requesting this test.

Reference range - 2 – 8 minutes.

Blood Film:

- Specimen - 7ml blood EDTA tube
- Remarks - A blood film is not routinely done on FBC requests unless specifically requested for. We are trying to do films on all abnormal FBC results as a routine, when there are laboratory staff available, to do the film reading.

Bone Marrow Aspiration and Trephine Biopsy – Please book it with the Medical Officer in charge of the Laboratory Services. Bone Marrow aspirates in outer islands should be referred as air-dried slides for processing at Vaiola Hospital.

Coagulation Profile:

- Specimen - 4.5ml blood citrate tube
- Reference range - see INR, PT, APTT
- Remarks - Laboratory should be notified first before any blood for coagulation test is done.
All blood taken for coagulation studies should be in the laboratory within 60 minutes of being taken.

Erythrocyte Sedimentation Rate (ESR)

- Specimen - 7ml blood EDTA tube
- Reference range - M 0 – 15 mm/hr
F 0 – 20 mm/hr

Remarks: ESR is not done routinely on FBC requests. If requested it must be specifically stated.

Fibrin Degradation Product (FDP)

Specimen - 4.5ml b blood citrate tube
Reference range - negative
Remarks - can be done on coagulation profile samples

Full Blood Count (FBC)

Specimen - 7 ml blood EDTA tube
Reference range - Hb M: 13 – 18g/dl
F: 11.5 – 16.5g/dl
WBC 4-11 x 10⁹ /L
Hct M: 0.40 – 0.54
F: 0.37 – 0.47
MCV 76 – 96 f.l.
MCH 27 – 32 pg
MCHC 31 – 35g/dl
Platelets 150 – 400 x 10⁹ /L

<u>Differential Count</u>	<u>Normal range</u>
Neutrophils	40 – 75%
Lymphocytes	20 – 45%
Monocytes	2 – 10%
Eosinophils	1 – 6%
Basophils	0 – 1%

Remarks: Since platelet counting in the laboratory is performed manually; it has to be specifically requested for, before it is carried out.

Haemoglobin - See FBC
Haematocrit - See FBC
INR - See FBC

Platelet count:

Remarks - Platelet has to be specifically requested for before it is done. It is not routinely carried out as part of FBC.

Prothrombin Ratio (Time – PT) - See INR

Specimen - 4.5ml blood citrate tube
Reference range - Normal - 1
Therapeutic - 2.5 – 4.0

INR (International Normalised Ratio)

Specimen - 4.5ml blood, cit rate tube
Therapeutic range - 2.0 – 4.0
Remarks - INR is used for monitoring warfarin therapy.

LE cells - Please notify laboratory first about this test before any blood is collected.

Malaria Parasites Spec. - 7ml blood - EDTA tube

Microfilarial parasites

Specimen - 7ml blood EDTA tube

Reticulocyte count

Specimen - 7ml blood EDTA tube

Reference range - Adult: 0.2 – 2.0%
Infant: 2.0 – 6.0%

6. Histopathology and Cytology

6.1 Telephone:

General enquiries – 336
SMO – Laboratory Services - 345

6.2 Working Hours

Normal Working Hours - 8:30am – 4:30pm Mondays to Fridays except holidays.

All other times; the medical officer can be contacted to provide the urgent service when needed.

6.3 Laboratory Procedures

a) Labelling.

All specimens should be labelled according to the labelling requirements and must be accompanied by the proper request forms.

Please remember to write down appropriate clinical/operative details, specimen type and a legible signature on the request form.

All specimens should be send directly to the histopathology section during normal working hours.

Unless it is of an emergency nature, or specimen referred from outer islands, no specimen should be send to the laboratory after hours. This should minimise the risk of loosing one of the most difficult to obtain, sample.

b) Routine Specimens in Histopathology

(i) Small biopsy: Immerse immediately in at least ten-fold volume of formalin in an adequate sized container.

(ii) Large biopsy. These specimens should be delivered to the laboratory as soon as possible for rechecking to ensure they are submerged in adequate formalin and all surfaces are exposed to allow proper fixation. After hours large specimen should be carefully opened to facilitate fixation in an adequate volume of formalin.

c) Non-Routine Specimens

(i) Frozen Sections

These can be done during normal working hours but they have to be booked at least 24 hours earlier for the laboratory to be adequately prepared for it.

(ii) Urgent Specimens

Medical Officer at the Histo Pathology service should be contacted when urgent specimens are send

6.4 Cytology Procedures

a) Fine Needle Aspiration

This can easily be booked to be done by the staff of the histopathology and cytology section.

If a clinician wants to do an FNA, one should remember to get a minimum of 2 to 4 slides obtained from 2 passes. Half the slides should be immediately, (within few seconds), fixed in alcohol for at least 15 minutes and the remainder of slides to be air dried.

In cases suspected of lymphoma, there must be air dried slides provided.

Specimens should be accompanied with a properly filled Histopathology/Cytology form.

b) Pap Smear (Cervical Smear)

After taking the Cervical smear (according to proper recommended procedures), the slides must be immersed immediately (within seconds) in a fixative like 95% ethanol (wet fixation) or an alternative fixative such as the Cytifix or Sprayfix. Any delay in fixation results in air-drying artefact which may hamper or prevent cytological assessment. Slides of cervical smears may be removed from the alcohol fixatives, after 30 minutes of fixation and dispatched in a slide container accompanied by a completed cytology laboratory forms.

c) Other Cytology Specimens

- (i) Sputum - An early morning, (prior to breakfast and teeth washing) deep cough specimen in a clean container is preferred. Saliva is unsuitable for assessment.

Chest physiotherapy may assist production of specimen – Sensitivity is increased if 3 specimens are collected on three different days.

- (ii) Bronchial brushings or washings.

These are rarely collected at Vaiola Hospital. If performed, please discuss with the Cytology Section so that adequate laboratory preparations can be made before hand.

- (iii) Urine

A 2-3 hour, whole output specimen, greater than 50ML is required. Early morning urines are NOT satisfactory due to advanced cellular degeneration in urine overnight. Because cells degenerate quickly in acid medium, all urine for cytology should be immediately added to an equal volume of 50% alcohol to enhance fixation and transported to the laboratory on the day of collection.

- (v) Pleural, pericardial or ascitic fluids.

The sample should be a direct aspirate and the container should contain sodium citrate (3 ml of 3.8%) to prevent clotting. If samples cannot be delivered straight to the laboratory, please keep them in the refrigerator (not the freezer!)

- (vi) Smears from ulcerated lesions.

Use a spatula or scalpel blade to scrape material from the surface, and smear on 2 – 4 slides. Fix the first 1 or 2 by immediate immersion in 95% alcohol, and the remaining thinner smears by air-drying.

6.5 Reports

Histopathology and Cytology reports are issued through the Senior Medical Officer in charge of the Laboratory Services, who is available to support and give relevant advise when needed. If you have any other queries, doubts or suggestions to be made, the staff of Histopathology and Cytology will be more than willing to help out.

7. Microbiology

7.1 Telephone Number

Extension 377

7.2 Hours of Duty

Normal working hours - 8:30am – 4:30pm Mondays to Fridays except holidays.

After Hours:

CSF is the only specimen processed without question during this time.

Other urgent specimens are processed after prior consultation with the microbiology staff on call.

Please note that rostered microbiology staff is on call from home and will have to be picked up by the hospital vehicle to carry out urgent microbiology tests.

Apart from the above; during the morning hours of weekends, holidays and certain times during the after hours period; the on call microbiology staff is usually required to do certain special procedures in the laboratory and may be available to be consulted there. These special activities include the need to review all culture and sensitivity tests on a daily basis, subculture of blood culture onto agar plates and to report any significant result to the clinician.

7.3 Laboratory Requests :

Quality of results depends on the quality of specimen.

All specimens must be completely labeled and accompanied by completely filled microbiology request forms. Please include in the clinical particulars current or recent antimicrobial therapy and state the exact identity and source of specimen. Any relationship to the post-operative period must be noted too. Pus swab as the only clinical particular is not acceptable.

Specimens accompanied by forms with incomplete data WILL NOT BE PROCESSED.

7.4 Specimens

a) Blood Cultures (BC)

These must be collected with strictest adherence to aseptic techniques.

A blood culture set consisting of two bottles, one for anaerobic and one for aerobic, are each inoculated with 5mls of blood.

3 sets of BC taken over 24 hours ensure a 97% isolation rate.

Venepuncture technique to minimise contamination.

- Cleanse skin with an iodine preparation (or 70% alcohol if allergic to iodine) and allow to dry.
- Collect 10mls blood
- Flip off aluminium foil cap and swab bottle tops with 70% alcohol. (not iodine)
- Use fresh needle and inoculate 5mls in each bottle.
- Check specimen label and complete request form before forwarding to the laboratory immediately.

Please remember that relevant clinical information is essential. If brucella or some odd infection is suspected, please note it clearly in the form or personally discuss it with the microbiology staff.

b) Cerebrospinal Fluid

Use special screw cap tubes available in the ward (LP-tray).

All CSF samples are treated as urgent samples on receipt.

c) Faeces

A small portion of faeces (teaspoon size) is adequate for bacteriological, parasitic cyst examination, and occult blood testing. Please use a stool collection container.

Send specimen to the laboratory as soon as possible after collection. For protozoan trophozoite examination, (giardia and Entamoeba histolytica) send "hot faeces; to be received in the laboratory within 30 minutes of collection. Select blood stained or mucoid portion of stool.

d) Fungal scraping (skin) (Mycology)

Please send patient and laboratory form to the laboratory. The laboratory staff do this test.

e) Pleural and other body fluids.

Collect fluid in a sterile container and send it to the laboratory immediately.

f) Sputum

Please ensure that sputum, not saliva is collected. Only one sputum specimen per patient, per day will be cultured – if suitable.

IMPORTANT: A separate form and separate sputum specimen must be provided for each of the following tests if required:

- AFB/Culture
- Routine culture (M/C/S)
- Cytology

g) Swabs

Swabs should only be used when tissue, pus or other material cannot be collected in a syringe or a sterile container. High vaginal swabs are of no value to diagnose PID and gonorrhoea in females. Endocervical swabs are essential.

Transport media are available from the laboratory for collecting and transport of specimens.

h) Tuberculosis Specimen

Urgent AFB stains will be done after prior consultation with the laboratory staff.

- Urines: Early morning specimens are preferred.
- gastric washing: These should be collected in the morning on fasting stomach.
- Sputum: Specimens should be collected in sterile plastic containers. A series of at least 3 samples on 3 successive days is recommended.

Early morning sputum is preferred.

Please note that TB specimens from 'Eua and Ha'apai, for the moment, will have to be send to Vaiola Hospital for processing.

i) Urines

Early morning mid-stream collections are preferred. It is essential to explain to the patient how to avoid vaginal or urethral contamination. Specimen received more than 2 hours after collection, and kept at room temperature are unsuitable, unless it was refrigerated. Overnight refrigeration of samples are acceptable.

j) Tissues and Biopsies

All tissues and biopsies for microbiology should be send in sterile jar; fresh and unfixed. Do not add formalin please.

k) Water testing: This is part of Public Health surveillance of the quality of water supply for the Public. Procedures involved will be available on request.

7.5 Reports

All urgent requests and unusual results will be communicated to the ward or clinician concerned as soon possible, once it is ready.

If clinicians wish to enquire about specific results, you are most welcomed to do so. Sometimes, only a provisional diagnosis will be available pending further identification and confirmation.

Eg. A blood culture may be reported as being positive for a gram negative bacilli, pending proper identification etc.

A final copy report will be available at the laboratory reception, once all procedures are completed.

8. Post Mortem

Due to the Hospital Mortuaries, rather limited facilities; Post Mortem procedures will be restricted only to Police cases, suspected of homicide.

This decision is based mainly on fundamental safety issues, that must be resolved first before any routine post mortem can be performed.

Any enquiries regarding the post mortem service should be directed to the Senior Medical Officer, in charge of the Laboratory Services.

9. Specimen Referral

9.1 From Outer Islands (by Air)

Whenever a clinician decides to send specimens to Vaiola Hospital from the Outer Islands, he/she must ensure that the laboratory section at Vaiola Hospital is notified in good time, to be ready when the specimen arrives. He can delegate this responsibility to the laboratory technician in the outlying island if required.

Specimens referred to Vaiola hospital are usually" serum for biochemistry and specialised immunology tests, tissue fixed in formalin for histology, pap smears already fixed in alcohol for at least 30 minutes, other slides for review (such as bone marrow), specimens for TB tests, overseas specimens and so forth. Since a lot of these specimens deteriorate quickly at room temperature, and are potentially biohazardous; they must be packed in a properly cooled, and well insulated packaging container, in compliance with IATA regulations. The Clinician and staff at Outer Island Stations are responsible for proper packaging and specimen transport to Vaiola Hospital.

Specimens should be received at Vaiola Hospital within a few hours of being send from the islands.

Further information on packaging requirement are available from the laboratory services.

9.2 Overseas Specimen

The following tests are referred overseas. If in doubt, please consult with the laboratory first with regards to the necessary specimen requirements before the sample is collected.

Acetyl choline receptor antibodies
ALTH (Adrenocorticotrophic hormone)
Activated Protein C (APC) resistance
Alpha-Fetoprotein
Aldosterone
Antinuclear antibody (ANA)
C-Peptide
CRP
CA 125 CEA
CKMB
Cardio lipin autoantibodies
Catecholamines
Cortisol
DHAS, DHEAS
ENA
Glycated Haemoglobin (HbA1c) - (Please note that HbA1C can sometimes be done at the Diabetic clinic when there are enough reagents).
Protein Electrophoresis
Drug level
Ferritin
Folate & B12

Free T3]
Free T4] - TFT
TSH]
gastrin
Hormone eg. LH, FSH, prolactin etc.
Immunoglobulins
Iron
Leptospirosis test
Paul Bunnell Test
PSA
Renin
TPHA
Troponin T
Viral studies

If a test is not on this list, please consult with the laboratory. Certain tests are also referred by the laboratory services for further testing and confirmation, overseas.

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