



Ipswich Haematology, Phlebotomy and Blood Transfusion User Guide		 East Suffolk and North Essex NHS Foundation Trust
HAT-IPS-INFO-6		
IPS / Haematology, Phlebotomy and Blood Transfusion		
Version: 8.1	Issue Date: See Q Pulse	

Haematology, Phlebotomy and Blood Transfusion Handbook – Ipswich Hospital


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Summary of Changes:
<ul style="list-style-type: none"> • CR13664 Reticulocyte time limit for testing • CR13665 ACA reference range • CR13670 Section 11.4 (BT send away tests) • CR13769 Addition of new Senior to staff list • CR14530 PALS address • CR14637 Phlebotomy collection times • CR15204 Addition of Ascetic fluid to rest repertoire


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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This User Guide has been produced to assist both hospital and community users of the Haematology, phlebotomy and blood transfusion laboratory service at Ipswich Hospital. It deals with access to the service, specimen requirements, information and labelling requirements. If this User Guide fails to provide information required, users are encouraged to contact relevant key personnel listed.

The Pathology Laboratory at Ipswich Hospital consists of Biochemistry, Haematology, Microbiology, Histopathology/Cytopathology and Blood Transfusion and is the only pathology provision on-site. The service is provided by the East Suffolk North Essex NHS Foundation Trust which came into effect 1st July 2019.

1.2 RESPONSIBILITY

It is the responsibility of management to effectively communicate information and sample requirements.

It is the responsibility of medical staff to give clinical advice where required.

It is the responsibility of senior technical staff to provide non clinical advice e.g. transport and packaging of samples.

It is the responsibility of clinical teams using the haematology service to follow the requirements laid out in this document.

1.3 RELATED DOCUMENTS

N/a

1.4 REFERENCES

ISO15189:2012

1.5 DEFINITIONS


BMS: Biomedical Scientist

DPA: Data Protection Act

ESNEFT: East Suffolk and North Essex Foundation Trust

GDPR: General Data Protection Regulations

GP: General Practitioner

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1.6 HEALTH & SAFETY/RISK ASSESSMENT


2 PROCESS

2.1 Key Personnel and contact details

The service is managed by East Suffolk and North Essex Foundation Trust. Key contacts are:

Consultant Medical Staff	Bleep	Email and Telephone
Dr A D Hodson Consultant Haematologist- ESNEFT Service Clinical Lead (Lab director)	126	andrew.hodson@esneft.nhs.uk Contact via secretary 01473 703718
Dr J. A. Ademokun Consultant Haematologist Lead for Blood Transfusion Antenatal Sickle Cell and Thalassaemia Screening Clinical Lead	160	debo.ademokun@esneft.nhs.uk Contact via secretary 01473 703718
Dr I Chalmers Consultant Haematologist Clinical Lead	125	isobel.chalmers@esneft.nhs.uk Contact via secretary 01473 703718
Dr I Whalley Consultant Haematologist Lead for Coagulation	904	ioana.whalley@esneft.nhs.uk Contact via secretary 01473 703718
Dr M Panatt Prahladan Consultant Haematologist	613	Mahesh.Prahladan@esneft.nhs.uk Contact via secretary 01473 703718

Biomedical Scientists	Email and Telephone
Ms J Powell Haematology and Blood Transfusion Service Manager	Jackie.powell2@nhs.net Tel: 01206 742407
Mr S Bhattacharjee Haematology Manager	Shubendu.Bhattacharjee@esneft.nhs.uk Tel 01473 703714 (Internal ext. 5714)
Ms C Conway Blood Transfusion Manager	Camilla.smith1@nhs.net Tel 01473 703396 (Internal ext. 5396)
Ms E Byworth Blood Transfusion Compliance Manager	Eleanor.byworth@esneft.nhs.uk N/a

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Ms J King Senior Biomedical Scientist Antenatal Sickle Cell and Thalassaemia Screening Lead	joanne.king@ipswichhospital.nhs.uk Tel 01473 703396 (Internal ext. 5396)
Mrs L F Pacquette Senior Biomedical Scientist	lucia.pacquette@ipswichhospital.nhs.uk Tel 01473 703713 (Internal ext. 5713)
Mrs Claire Kelly Senior Biomedical Scientist	claire.kelly@ipswichhospital.nhs.uk Tel 01473 703713 (Internal ext. 5713)
Mr R Banthorpe Senior Biomedical Scientist	Robert.Banthorpe@esneft.nhs.uk Tel 01473 703713 (Internal ext. 5713)
Mr C Smith Senior Biomedical Scientist	christopher.smith5@nhs.net Tel 01473 703713 (Internal ext. 5713)
Miss Lisa Lewis Senior Biomedical Scientist	Lisa.Lewis@esneft.nhs.uk Tel: 01473 703396 (Internal ext. 5396)
Mr M Bowen Senior Biomedical Scientist	Mareece.bowen@esneft.nhs.uk Tel: 01473 703713 (Internal ext. 5713)


Quality Team

Email and Telephone

Mr Nigel Brinkley Blood Transfusion Quality Manager	nigel.brinkley@nhs.net Tel 01473 703396 (Internal ext. 5396)
Mr Nick Sheppard Blood Transfusion Quality Manager	Nick.Sheppard@esneft.nhs.uk Tel 01473 703396 (Internal ext. 5396)
Mr Richard Nevin Haematology Quality Manager	Richard.Nevin@esneft.nhs.uk Tel 01473 704171 (internal ext. 6171)
Mrs Sheila Cook Phlebotomy Quality Lead	Sheila.cook@esneft.nhs.uk Tel 01473 704171 (internal ext. 6171)

Transfusion Practitioners

Bleep Email and Telephone

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Ms R Smith Transfusion Practitioner	900	rebecca.smith@ipswichhospital.nhs.uk 01473 703391 (Internal ext. 5391)
Mrs S Kaznica Transfusion Practitioner	900	sharon.kaznica@esneft.nhs.uk Tel 01473 703391 (Internal ext. 5391)
Mrs S Clarke Transfusion Practitioner	900	sarah.clarke@esneft.nhs.uk Tel 01473 703391 (Internal ext. 5391)

Department Telephone Numbers

Department	Telephone	
Haematology	External	01473 703709 or 703710
	Internal	5709 or 5710
Blood Transfusion Enquiries (09.00 – 17.00 Monday – Friday)	External	01473 703726
	Internal	5726
Other times bleep 905		
Secretary to Medical Staff (09.00 – 17.00 Monday – Friday)	External	01473 703718
	Internal	5718


2.1 Data Protection and Patient Confidentiality

The EU General Data Protection Regulation (GDPR) is a pan-European data protection law, which superseded the EU's 1995 Data Protection Directive and all member state law based on it, including the UK's DPA 1998 (Data Protection Act 1998), on 25 May 2018.

The GDPR extends the data rights of individuals (data subjects), and places a range of new obligations on organisations that process EU residents' personal data.

3 COMPLAINTS

To make a complaint contact the Patient and Liaison Service (PALS) as follows:

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3.1 By phone

PALS can be contacted by telephone from 9am to 4pm, Monday to Friday
 (Confidential answerphone out of hours)
 Free phone 0800 783 7328
 Direct line 01206 742683 or 746448

If your call is urgent and you require assistance outside these hours please dial 01206 747474 and ask to speak to the Duty Matron.

3.2 In writing

Patient Advice and Liaison Service
 Ipswich Hospital
 Heath Road
 Ipswich

3.3 By email

PALS@esneft.nhs.uk

4 LOCATION OF LABORATORY

The Haematology Department is located in the Pathology Department at ESNEFT - Ipswich Hospital, Heath Road, Ipswich IP4 5PD – in the central zone.

For a location map click on the link below.

<https://i3a5v6j6.stackpathcdn.com/wp-content/uploads/2020/06/IPSWICH-2020June-Guide-Colour-002.pdf>


5 SERVICES OFFERED BY THE LABORATORY

The Haematology Department offers the following services:

- Haematology
Blood Transfusion
- Antenatal Screening

The laboratory provides INR results to the Anticoagulation Monitoring Service (AMS). Please contact the AMS directly for any queries relating to outpatient anticoagulant monitoring. Tel: 01473 702677

For Immunology queries contact immunology at Addenbrookes Hospital directly. Tel: 0333 103 2220

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6 LABORATORY OPENING TIMES

The Haematology laboratory is open 24 hours a day, 7 days a week. See below for opening times for phlebotomy services (blood tests).

7 OUT OF HOURS SERVICE PROVISION

7.1 Blood Transfusion

Anytime, in the event of an MHP bleep 905
 Between 09:00 – 17:00, call Ext 5726
 Between 17:00 – 09:00, bleep 905

7.2 Haematology / Coagulation

Anytime, call Ext 5709
 All Emergency Department (A&E) requests where there is a likelihood of 4 hour breach must be notified by telephone/bleep to the relevant department.

8 CLINICAL ADVICE AND INTERPRETATION

Clinical advice is available from the consultant medical staff and from the consultant on call during evenings and weekends via switch. Non clinical advice is available from senior BMS staff

9 INFORMATION FOR PATIENTS AND VISITORS


Patients requiring information on preparing to visit Ipswich Hospital should see the hospital's internet pages.

10 PATIENT CONSENT

East Suffolk and North Essex NHS Foundation Trust (ESNEFT) is committed to ensuring that all staff involved in the patient consent process adhere to the Department of Health guidance on consent to examination and treatment.

Patients have a fundamental legal and ethical right to determine what happens to their own bodies. Valid consent must be obtained before starting treatment or physical investigation, or providing personal care, for a person, and is a fundamental part of good practice. A healthcare professional (or other healthcare staff) who does not respect this principle may be liable both to legal action by the patient and to action by their professional body.

Consent is presumed with regards blood tests when the sample and request form – containing the requestor details – arrives in the laboratory.
 Phlebotomy presume consent when the patient arrives for the phlebotomy appointment with a completed request form and presents for venepuncture.

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10.1 Outpatients

An appointment system is in place for community and out-patient department phlebotomy and can be accessed by following the link below:

<https://www.esneft.nhs.uk/service/bloodtests/>

Phlebotomy appointment: Landseer Road Phlebotomy Clinic, 476-478 Landseer Road Ipswich Suffolk IP3 9LU Monday to Friday 07:30 – 17:30 (Children aged 11 – 16).

Laboratory Phlebotomist Opening Hours (hospital): The laboratory open hours are Monday – Friday 07:30 – 17:45.

Children under 11 years of age should not be referred for blood tests to the department but arrangements can be made with the Paediatric Assessment Unit (telephone 01473 702198 for advice).

10.2 Inpatients

The phlebotomists visit all the wards with the exception of paediatric wards on a daily basis between 07.30 and 12:00. They are unable to return to wards, so all request forms should be available from 07.30. Please do not forward order unnecessarily as the presence of large numbers of forms on the request clip delays the round. A Saturday and Sunday morning service is provided for the acute medical and surgical wards from 07:30 to 11:30. Please keep weekend ordering to a minimum, i.e. clinically essential orders only.

The phlebotomists will only have two attempts at venepuncture and if unsuccessful will refer the request back to the originator.


11 THE REQUEST FORM & SAMPLE

11.1 Request Form

Electronic request forms (Lorenzo or ICE) should be used whenever possible. It is essential that the request form bears - as an absolute minimum - the patient's name, case number (whenever this is available, or address if the hospital number is not known), time of sampling, date, the signature of the person making the request and the location to which the report is to be sent.

All requests sent to the laboratory are considered a service agreement between the requester and the laboratory to undertake the analysis of the sample for the tests requested. The laboratory may refer the sample to another laboratory for specialised or confirmatory analysis in order to provide the results.

All antenatal screening requests must be accompanied with a fully completed family origin questionnaire & possibly orange antenatal booking form. This must contain the estimated delivery date and ethnic origin of the parents.

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11.1.1 Patient's Gender

Please complete as gender not always easy to ascertain from name and is essential for interpretation of results.

11.1.2 Requester Details

Clearly identify the name and location of the requester and the location for copies of the report to be sent if required.

11.1.3 Tests Required

Tests required must be entered.

11.1.4 Clinical Details

Appropriate clinical details to enable accurate interpretation of findings. Note Blood Transfusion send away tests may need discussion with Haematology Consultant.

11.1.5 Priority Status

Requests are assumed routine unless marked 'URGENT' or 'PLEASE PHONE', a telephone number or bleep number must be stated to reduce delays in contacting the requester. Electronic request forms must be completed as prompted on screen.

11.2 Samples

11.2.1 Minimum Labelling Criteria for Haematology Samples


The minimum labelling criteria for Haematology samples is surname, forename, date of birth plus one of the following: hospital number or NHS number.

11.2.2 Specific Requirements for Blood Transfusion Samples

All blood transfusion samples must be labelled by hand. The minimum criteria is full name (surname and first name), hospital number or NHS number, date of birth, date and time of collection and the sample must be signed by the person who took the sample. Failure to meet these labelling criteria will result in the specimen being rejected.

11.2.3 Minimum Labelling Criteria for Maternal Serum Screen Samples

Samples for Maternal Serum Screen must include; the patient surname and either the hospital number or NHS number as one of the three patient identifiers.

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11.3 Sample Rejection

Samples may be rejected due to minimum labelling criteria above not being met, or due to issues with sample integrity (e.g. haemolysis, icterus etc.). The requestor will be notified when an urgent sample is rejected.

11.4 Samples for Send Away Tests

Samples for leukaemia Immunophenotyping / cell markers (BCR / ABL, JAK2, PNH Screen, EMA dye test and FISH), genetics / chromosomes (HFGE and HFE) and tissue typing (HLA and HLA B27) must contain four points of reference, e.g. full name (surname and first name), hospital number or NHS number and date of birth and be sent with a Haemato-Oncology Diagnostic Service (HODS) form.

Send away samples for Blood Transfusion (for example, HIT, NAIT, etc.) must be signed by the requestor and be accompanied by the appropriate NHSBT request form (available by request from the Blood Transfusion Department)

11.5 High Risk Samples

High Risk samples from patients with (or suspected to have) Creutzfeldt- Jacob Disease (CJD), Transmissible Spongiform Encephalitis (TSE), Ebola, Viral Haemorrhagic Fever, or Rabies must be labelled clearly with Danger of Infection on the request form and sample bags. The Laboratory must be notified that the samples are coming prior to collection and the request must be discussed with the relevant consultant. All samples from these patients must be sent in the Red High Risk Transporter Boxes available from Pathology.

12 OUTLINE OF TESTS PROVIDED

12.1 Haematology

FBC, ESR, malaria screening, CSF morphology for malignant cells, glandular fever screening, sickle screening, G-6-PD deficiency screening, haemoglobinopathy screening, and leukaemia diagnosis (referred out test).


12.2 Coagulation

Coagulation screening, heparin and warfarin monitoring for inpatients, d-dimer assay, factor assays and thrombophilia screening.

12.3 Transfusion

Blood group and antibody screen, provision of blood and blood products, antenatal blood group serology, maternal and cord testing post-delivery, Kleihauer testing and investigation of neonatal jaundice.

The Ipswich Hospital Blood Policy covers all aspects of blood transfusion including ordering of blood, blood products, information on transfusion and procedure to follow after a possible transfusion reaction.

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13 SAMPLES REQUIRED

Sample collection is standardised on the Sarstedt Monovette system and samples should be collected only in these containers. For paediatric haematology and coagulation samples, small volume tubes of the same range are available. 1.6ml blue topped tubes are available for paediatric use for the blood transfusion department.

This is not a complete list of tests; a full list of tests can be found in the Sample Requirements of the ESNEFT Pathology Website:

<https://esneftpathology.nhs.uk/>


For immunology queries contact the Immunology Department at Addenbrookes Hospital directly. Tel: 01223 245151 / 0333 103 2220

14 SUMMARY OF TESTS REFERRED TO OTHER LABORATORIES

Tests not available at Ipswich Hospital are referred to selected laboratories for testing. Samples to be sent to the Regional Genetics/Cytogenetics Laboratory at Cambridge, HODS at Addenbrookes and Tissue Typing at Addenbrookes, require specific request forms to be completed, which can be downloaded from:

<https://www.cuh.nhs.uk/addenbrookes-hospital/services/genetics-laboratories/sample-requirements-and-test-request-card/request-card-labelling-and-consent>

Test	Sent To
Genetic and chromosome studies	Regional Genetics/Cytogenetics Laboratory, Cambridge
Leukaemia diagnosis	HODS, Addenbrookes
Neurological gene assays	Rare & Inherited Disease Laboratory of the London North Genomic Laboratory Hub
Neurological antibodies	Rare & Inherited Disease Laboratory of the London North Genomic Laboratory Hub
Immunology	Immunology, Addenbrookes
Platelet Function	Coagulation, Addenbrookes
HLA typing	Tissue Typing, Addenbrookes
Platelet, WBC and RBC serological investigations, antenatal antibody serology	NHS Blood and Transplant (Colindale & Filton)
EPO assay	Biochemistry, Kings College Hospital

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15 RANGE OF TESTS AVAILABLE OUTSIDE CORE HOURS

- Full blood counts and blood film where appropriate
- Screening for malarial parasites
- ESR
- Coagulation screen, D-dimer, INR and APTT , anti-FXa (Hep)
- Provision of blood and blood products
- Kleihauer test
- Blood group and DAT (direct antiglobulin test) on babies
- All other requests should be discussed with the BMS on duty or consultant haematologist on call.

16 TRANSPORT OF SAMPLES

16.1 Transport of Samples from GP Surgeries

The Pathology Department provides a daily collection service from all GP surgeries. Samples for collection should be individually bagged then placed in a large sealed plastic bag with sufficient wadding to absorb spills.

16.2 Transport of Samples from Wards

Samples for collection should be individually bagged then placed in a large sealed plastic bag with sufficient wadding to absorb spills. The large bag should be delivered to the pathology reception by the portering staff.

16.3 Transport of Samples via Air Tube


Samples transported via the air tube must be placed in a sealed plastic sample bag with the request form in a separate pocket to the sample. Samples should be sent to either the haematology or blood transfusion stations. All haematology samples may be sent via the air tube system (except High Risk Samples, CSF or samples for platelet function, which should be delivered by hand).

16.4 Extremes of Temperature

Avoid extremes of temperature when transporting samples to avoid sample deterioration.

17 STORAGE OF SAMPLES

If possible deliver sample to the laboratory the same day, all wards samples should reach the laboratory within a few hours of collection. Samples from outside the hospital that cannot be delivered that day should be stored in a refrigerator overnight and delivered the next morning. The refrigerator should maintain a temperature between 2°C and 8°C, it is especially important that the samples do not freeze.


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Incorrectly stored samples may result in sample deterioration as seen by prolonged clotting times, degenerate blood films, loss of antibody strength and haemolysed samples, for example.

18 TURNAROUND TIMES

These times refer to the time from receipt of a sample in the department to validation (or interim validation) of a result which then becomes available electronically.

Test	Urgent	Routine
Full blood count	1 hour	24 hours ³
Ascetic Fluid	N/A	24 hours ³
Peripheral blood films	24 hours ³	48 hours ³
Malarial parasites	2 hours	
G-6-PD	N/A	3 days
ESR	2 hours	24 hours
Clotting screen	1 hour	4 hours
D-dimer	1 hour	4 hours
CSF and other fluids	1 hour	3 days
Glandular fever screen	1 hour	3 days
Haemoglobinopathy screen*	1 day	14 days
Coagulation factor assays* (excluding VWF Antigen and Activity)	24 hours	7 days
VWF Antigen and Activity*	2 days	7 days
Thrombophilia screen*	1 day	14 days
Emergency provision of blood (if previously grouped and antibody screened negative)	10 minutes	N/A
Provision of blood (if NOT previously grouped and antibody screened)	60 min (provided no antibodies detected) ¹	N/A
Provision of fully Crossmatched Blood (if previously grouped and antibody screen is positive or known antibodies)	Variable, contact department for advice ²	N/A
Provision of blood products FFP Platelets Cryoprecipitate Fractionated and recombinant products (e.g. prothrombin complex, human albumin etc.)	40 min Contact department 40 min 10 min	N/A
Maternal and cord post-delivery testing	N/A	2.5 days
Kleihauer film*	1 hour	2.5 days
Investigation of neonatal jaundice	1 hour	1 day

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Blood group and antibody screen	1 hour	2 days
Immunology Autoimmune assay*	1 day	7 days
Allergy	N/A	14 days

* Urgent requests must be discussed with consultant haematologist

¹ If antibodies are present the provision of compatible blood cannot be guaranteed

² When antibodies are known to be present Blood Transfusion must be contacted as soon as possible; non urgent treatment should be delayed until blood is available.

³ Clinically urgent results will be phoned without delay

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Further tests may be added to existing samples held in the department provided:

- The request is made within the time limits stated below
- There is sufficient sample for the test

Requests should be made to Haematology Reception.

Original Sample	Other tests possible to request	Time limit for additional tests
FBC	Blood film, G6PD, malarial parasites. haemoglobinopathy screening	24 hrs
FBC	ESR	21 hrs
FBC	Reticulocytes	96 hrs
Coagulation Screen	D-Dimer	24 hrs
Coagulation Screen	Factor assays	4 hrs
APTT	INR	72 hrs
Immunology	Additional immunology	28 days

20 FACTORS AFFECTING THE PERFORMANCE OF THE TESTS


The quality of the results obtained can be affected by the quality of the sample received.

20.1 Blood sampling

Blood should be collected into Sarstedt blood tubes directly by clean venepuncture with minimum cuff pressure and not filled from a syringe. After collection mix samples gently avoid vigorous shaking. Check the expiry date of sample vials before use. These blood tubes must not have been exposed to extremes of temperature prior to collection (above 30°C)

If used correctly the correct volume of blood will be collected, this is essential for coagulation and ESR tests.

Coagulation tests, other than basic clotting screen, APTT and INR, are best collected in the hospital to ensure minimum delay in the sample reaching the laboratory. Samples from wards should be delivered immediately to the laboratory.

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Results of poor sampling will include haemolysed samples, activated coagulation samples, and partially clotted samples all of which can affect the result obtained.

21 QUALITY STANDARDS

The Haematology Department is accredited by the following professional, accreditation and regulatory bodies:

21.1 IBMS (Institute of Biomedical Sciences)

(<http://www.ibms.org/>)

The department is approved for pre-registration and post-registration BMS training and support staff training.

21.2 MHRA (Medicines and Healthcare Products Regulatory Agency)

(<http://www.mhra.gov.uk/>)

Compliance assessed annually by MHRA

21.3 UKAS (United Kingdom Accreditation Service)

<https://www.ukas.com>

Accredited to ISO 15189:2012

Reference no. 9332

22 RELATED DOCUMENTS


- Blood Policy – See Trust webpages
- Pathology Laboratory Guide (Sample Requirements)

23 REFERENCE RANGES

All numerical results have reference ranges printed on the report with the result. Reference ranges may be sex and age related.


23.1 Summary of the Main Adult Reference Ranges

NOTE: Paediatric and gender reference values may be different from adult ranges contact department for details.

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23.2 Haematology

Assay	Reference Range	Reporting Units
FBC - Hb	115 – 160 (F) 135 – 175 (M)	g/l
- WBC	4.0 – 11.0	X10 ⁹ /l
- Platelets	135 – 450	X10 ⁹ /l
- RBC	3.8 – 4.8 (F) 4.5 – 5.5 (M)	X10 ¹² /l
- Hct	0.35 – 0.45 (F) 0.38 – 0.50 (M)	
- MCV	80 – 100	fl
- MCH	27.0 – 34.0	pg
- Neutrophils	2.0 – 7.5	X10 ⁹ /l
- Lymphocytes	1.0 – 4.0	X10 ⁹ /l
- Monocytes	0.1 – 1.0	X10 ⁹ /l
- Eosinophils	0.0 – 0.5	X10 ⁹ /l
- Basophils	0.0 – 0.2	X10 ⁹ /l
- Reticulocytes	10-100 (0-16) 10-100 (17-120)	X10 ⁹ /l X10 ⁹ /l
ESR	Female Aged 0-60: 1-19 Aged 61-70: 1-20 Aged 71-120: 1-35 Male Aged 0-50: 1-10 Aged 51-60: 1-12 Aged 61-70: 1-14 Aged 71-120: 1-30	mm/hr

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23.3 Coagulation

Assay	Reference Range	Reporting Units
Clotting Screen - INR	0.9 – 1.2	Ratio
- PT	11 – 15	sec
- APTT	26 – 37	sec
- Fibrinogen	2.0 – 4.5	g/l
*D-dimer (for exclusion of DVT/PE)	<500	ng/ml (FEU)
Thrombin Time	10.5 – 16.5	secs
Coagulation factors		
- II	0.5 – 1.5	u/ml
- V	0.5 – 1.5	u/ml
- VII	0.5 – 1.5	u/ml
- VIII	0.5 – 1.5	u/ml
- IX	0.5 – 1.5	u/ml
- X	0.5 – 1.5	u/ml
- XI	0.7 – 1.5	u/ml
- XII	0.7 – 1.5	u/ml
- XIII	0.5 – 1.4	u/ml
- VWF Antigen	Blood Group A, B and AB: 0.66 – 1.76 Blood Group O: 0.42 – 1.41	u/ml u/ml
- VWF Activity	Blood Group A, B and AB: 0.49 – 1.63 Blood Group O: 0.40 – 1.26	u/ml u/ml
Thrombophilia		
- Antithrombin	75 – 125	IU/dl
- Protein C	70 – 130	IU/dl
- Free Protein S	55 – 125 (F) 75 – 145 (M)	IU/dl
- APCR ratio	2.0 – 3.5	
- DRVVT ratio	<1.2	
- Corrected DRVVT ratio	<1.2	
- DRVVT ratio/ Corrected DRVVT ratio	<1.2	
- Cardiolipin Ab IgM	0 – 9	MPL u/ml
- Cardiolipin Ab IgG	0 – 9	GPL u/ml

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- β 2 Glycoprotein Ab IgM	0 – 6	u/ml
- β 2 Glycoprotein Ab IgG	0 – 6	u/ml

**Note change to reportable units from non FEU to FEU and change to negative cut off value for VTE*

23.4 Special Haematology

Assay	Reference Range	Reporting Units
HbA ₂	2.2 -- 3.5	%
Hb F	0 – 1.0	%
G6-PDH	5.2 - 11.6	IU/gHb