Title: Blood Transfusion Laboratory User Handbook

No.of copies :	1
Location of copies :	1. The Hub
	2.

Contents

Introduction

Dear Colleagues,

In this handbook you will find basic information concerning the Blood Bank including contact names and telephone numbers. Details of tests performed and other services are given along with the turnaround time for the tests. You may already be in possession of some of these facts and this guide is really a compilation of the appropriate information in one booklet which we hope you will find useful.

Although laboratory turnaround times are shown experience has indicated that unexpected delays can occur in the transmission of results.

High risk specimens

All samples which are regarded as high risk should have both the request form and the specimen labelled with the appropriate "high risk" sticker.

Samples from patients falling into the categories below should be regarded as high risk for the laboratory:-

HIV antibody positive.
Hepatitis B surface antigen or e antigen positive.
Hepatitis C positive.
IV drug user
Recent jaundice - cause not known.
Patients with clinical features of AIDS.

Referred work

The Blood Bank refers work to the NHSBT Red Cell Immunohaematology Laboratory and Histocompatibility and Immunogenetics Laboratory in Sheffield. The laboratories are UKAS accredited.

Services offered by NHSBT Red Cell Immunohaematology can be found here: http://hospital.blood.co.uk/diagnostic-services/red-cell-immunohaematology/

Services offered by NHSBT Histocompatibility and Immunogentics can be found here:
http://hospital.blood.co.uk/diagnostic-services/hi/

Specific sample requirements can be sourced from the laboratory protocol Blood Transfusion Referral List, LI-BB-LAB-104, which is available on request.

Location of the laboratory

The Blood Bank Laboratory is situated on 'A' level (top floor). Following the signs for Pathology and at the T junction near the central lifts go down the corridor opposite the lifts and the Pathology Department is first on the left. Pathology Reception is straight ahead.

Transportation of specimens

Hospital samples are delivered either via the air tube system or by hand to the Pathology Specimen Reception Department. Blood Transfusion requests are given high priority by the Specimen Reception Department – the requests are firstly time/date stamped and then sent to the Blood Bank as soon as possible.

Blood transfusion samples must be no more than 4 days old when tested. Short, clotted and haemolysed samples may be unsuitable for testing.

Antenatal serology samples are usually delivered by hand or transported using Courier Logistics from G.P practices.

Blood Bank Staff and contact details

Medical Consultant haematologists	
Consultants	(01709) 42 followed by 7419, 4720, 7111,4188
Secretaries	(01709) 42 followed by 7112 or 7119
Scientific/Administrative staff	
Blood Transfusion Manager	(01709) 424088
Deputy Blood Bank Manager	(01709) 427107
Transfusion Practitioner	(01709) 427666
Intergrated Pathology Quality Manager	(01709) 424008
HTT Administrator	(01709) 424760 / 427666
Blood Transfusion Laboratory	(01709) 427107

Laboratory Hours

Monday – Friday (09:00 – 17:30 hrs)	Routine Service
Saturday Morning (09:00 – 13:00 hrs)	Routine Service
All other times (incl Bank Holidays)	Out of hours service

Out of hours

The Blood Bank/Haematology Biomedical Scientist on-call can be contacted via telephone number (01709) 424236 or the hospital switchboard (01709) 820000. All out of hours requests must be phoned.

The Consultant Haematologists are available via the hospital switchboard and radio pagers – ask for the Clinical Haematologist on-call. The Haematologists are available 24/7 to offer clinical advice and interpretation of results.

Patient consent

Information can be found on the General Laboratory Medicine homepage.

Protection of personal information.

Information can be found on the General Laboratory Medicine homepage.

Laboratory complaint procedure

Information can be found on the general laboratory medicine homepage.

Receipt of samples

The labelling requirements for request forms and blood specimens are derived from National Guidelines and the Blood Bank operates a zero tolerance policy – in the event of omission, illegibility, error or crossings out the request will not be processed. Request forms and blood specimens once received by the laboratory cannot be amended.

Samples and forms for Blood Transfusion / Antenatal Serology / Kleihauer requests must meet minimum labelling requirements that are:

Form – surname, first name, NHS number (when available), hospital number, full date of date of birth, gender, pregnancy status, clinical details, authorised practitioner signature, signature of the person taking the specimen and the date and time. Addressograph labels are permitted.

Other information required is the Ward and Consultant. Try and answer all the questions on the form and then indicate what is required, group and save only or issue of blood components. If blood components are required state the quantity and the date and time that they are required to be available and any special requirements e.g. irradiated. Please note that crossmatched blood is only kept on standby for 24 hours from the time that the blood is required.

Blood sample (including paediatric) – 4.9 mls EDTA (blue top) - must be hand written – addressograph labels are not permitted. Details required are surname, first name, hospital number, full date of birth, gender, date and time taken and the signature of the person taking the sample.

Unknown male/female admitted to the Accident and Emergency Department require on the sample: hospital number, gender, date and time specimen taken and the initials of the person taking the blood. The form also requires an authorised signature, clinical details and what is required.

Test	Sample	Results Available
Adult Group + Antibody Screen with or without X-matching	X-match tubes – 4.9ml - blue top. Blood specimen must be kept warm for CHAD patients.	24 hours
Transfusion reaction investigation	X-match tubes – 4.9ml - blue top x 4 samples Implicated unit and paperwork returned to laboratory	Serological investigation - 24 hours
Paediatric (< 4months)	X-match tubes – 4.9ml - blue top.	24 hours
Kleihauer (FMH) – separate request forms are required for mother and baby at delivery	Maternal - X-match tube – 4.9ml - blue top + EDTA bottle - 4.9ml - red top. Cord - EDTA - bottle - 4.9ml - blue top.	72 hours
DAT – Direct Coomb's Test	EDTA bottle - up to 4.9ml	24 hours

	volume - blue top	
Antenatal serology	4.9ml blue top	72 hours

Please refer to Blood Sciences and Micorbiology user Handbooks for sample requirements and turnaround times for tests required for transfusion reaction investigation

Sample validity

Patients over 4 months old	Provided that the patient has not been transfused with red cells or platelets within the last 3 months and if the patient is not pregnant or has not been pregnant within th last 3 months the sample is valid for 7 days. If during this time the patient is transfused with red cells or platelets the sample validity reduces to 72 hours from the time that the transfusion commenced. If a patient has been transfused with red cells or platelets within the last 3 months the sample is only valid for 72 hours. If the patient is currently pregnant or has been pregnant within the last 3 months the sample is only valid for 72 hours.
Patients under 4 months old	No new sample is required until the patient is 4 months old. However, if the patient has a positive DAT or the mother has atypical red cell antibodies the maternal sample, which is required for crossmatching the baby, will be valid for only 72 hours.

Check group samples

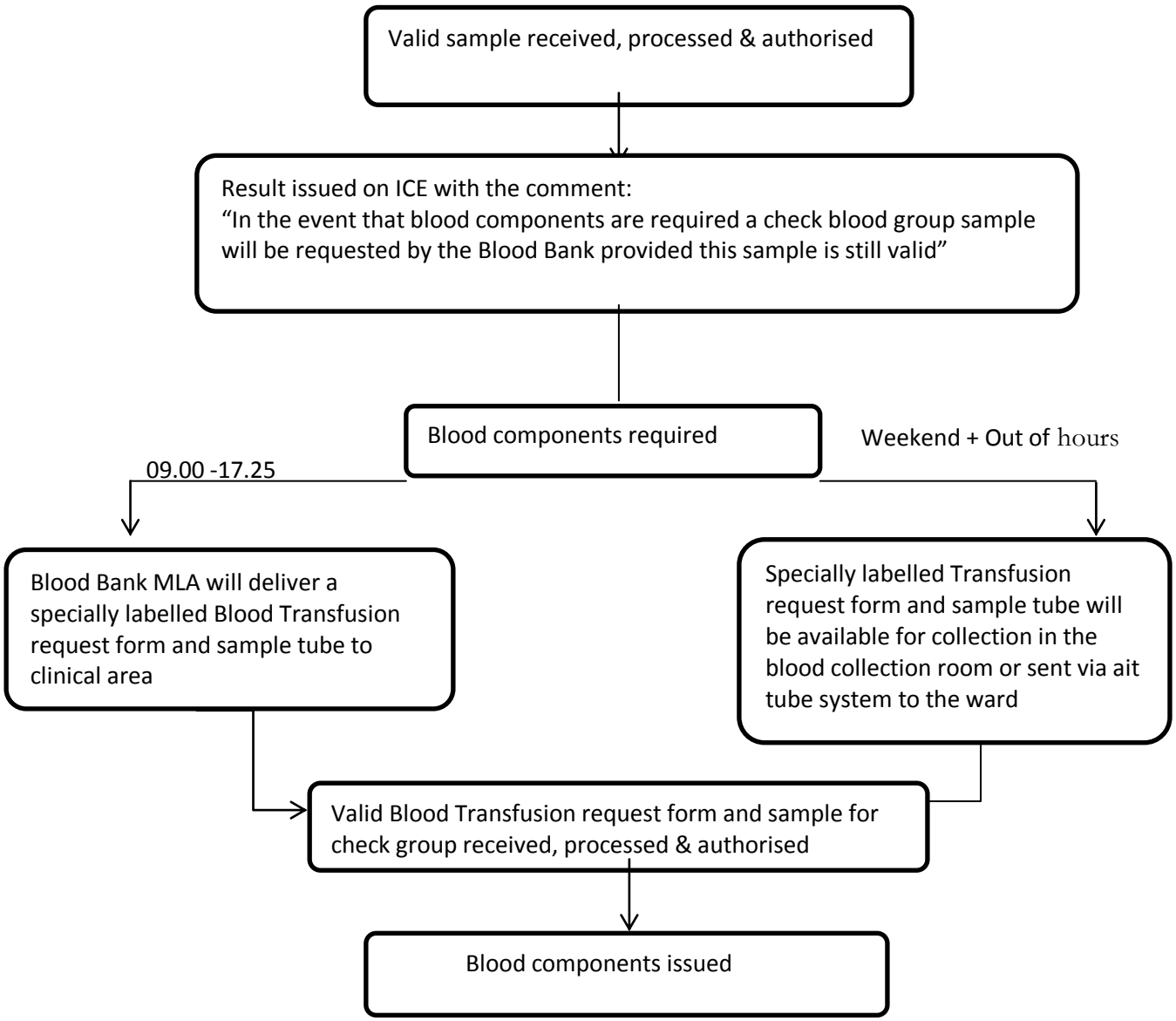
To conform to current BCSH guidelines for patients requiring blood components, when there is only one blood group on file, a check blood group sample will be required. Until a valid check group sample is received group O Rh D Negative blood will be provided. Please see flow chart on the next page.

Measurement of Uncertainty

All pathology assays carry an inevitable degree of uncertainty. Whilst many factors are well recognized (pre-analytical variables, analytical precision) some occur by random error alone. (A random error is associated with the fact that when a measurement is repeated it will generally provide a measured value that is different from the previous value. It is random in that the next measured value cannot be predicted exactly from previous such values).
Users should bear in mind these uncertainties when interpreting any laboratory value.
The laboratory is happy to discuss analytical variation with any user of the service.
Laboratory NEQAS performance data is available to any interested user – please contact the laboratory Manager.

Overview flowchart

A check group sample is only required when the first time patient sample is still valid i.e. there is no transfusion history for the patient.



Urgent requirement for blood: The Check Group sample procedure should not interfere with the urgent delivery of blood and has been introduced to help prevent ABO incompatible blood transfusions. With this in mind Group O Rh D Negative* blood will be issued until the patient group has been confirmed.

In the event of major bleed please activate the Massive Haemorrhage Procedure by contacting switchboard on 2222

***In some instances Group O Rh D Positive blood may be issued to male patients.**

Antenatal Screening Service

Antenatal serology screening involves blood group determination and identification of atypical antibodies associated with haemolytic disease of the newborn and Microbiology screening – see flow chart. A separate Microbiology request form and sample (4.9ml brown top blood) is required – for further information regarding microbiology screening of antenatal patients refer to the Microbiology Handbook.

Blood group and red cell antibody screening (see flow chart below)

These tests are performed twice during each pregnancy, once at booking (6-16 weeks) and again at 28 weeks.

Samples on patients who have developed significant red blood cell antibodies may be required more often than usual, the frequency of which will be indicated on the antenatal report along with the number of blood samples required. The samples are required to monitor the strength (titre) of the antibody(ies) concerned and to identify pregnancies which may be at risk from Haemolytic Disease of the Newborn (HDN). The samples also monitor the possible formation of additional allo-antibodies during the pregnancy. Patients who have developed red cell antibodies should be referred to an Obstetrician.

The current guidelines state that women with anti-c, D, K or K related antibodies require repeat samples every 4 weeks until the 28th week of pregnancy and thereafter every 2 weeks until delivery.

Other specificities commonly implicated as causing HDN include anti-C, E, Fy(a) and Jk(a) though there are many other rarer antibodies. Guidelines recommend testing these patients at booking and at 28 weeks of pregnancy only although further testing will be performed as required.

Anti-Le(a), Le(b), N, Lu(a), P1, H and A1 are not considered to be clinically significant with respect to HDN.

When the mother develops a significant red blood cell antibody a paternal sample may be requested. This is to determine the father's phenotype and predict the likelihood of the foetus carrying the relevant red cell antigen which may indicate whether there is the possibility of HDN.

The red blood cell membrane contains numerous antigenic molecules which may induce the production of plasma antibodies. Currently there are more than 600 known red cell antigens. Immunisation is caused by exposure to 'foreign' red cells via pregnancy or transfusion although some plasma antibodies are naturally occurring.

The following table shows important antibodies that are encountered :

Blood Group System	Antibody	Causes Transfusion Reaction?	Causes HDN?	% Blood Compatible
Rhesus	Anti-c	Probable	Common	20
Rhesus	Anti-C	Probable	Possible	32
Rhesus	Anti-C^w	Probable	Possible	98
Rhesus	Anti-D	Probable	Common	15
Rhesus	Anti-e	Probable	Possible	2
Rhesus	Anti-E	Probable	Possible	71

Kell	Anti-k (Cellano)	Probable	Possible	0.2
Kell	Anti-K	Probable	Possible	91
Kell	Anti-Kp^a	Probable	Possible	98
Duffy	Anti-Fy^a	Probable	Possible	34
Duffy	Anti-Fy^b	Probable	Possible	17
Kidd	Anti-Jk^a	Probable	Possible	23
Kidd	Anti-Jk^b	Probable	Possible	26
Lewis	Anti-Le^a	Rare	Unlikely	78
Lewis	Anti-Le^b	Unlikely	Unlikely	28
MNS	Anti-M	Unlikely	Unlikely	22
MNS	Anti-N	Unlikely	Unlikely	28
MNS	Anti-s	Probable	Possible	11
MNS	Anti-S	Probable	Possible	45
MNS	Anti-U	Probable	Possible	<0.1
P	Anti-P1	Unlikely	Unlikely	21
Lutheran	Anti-Lu^a	Unlikely	Unlikely	92
Lutheran	Anti-Lu^b	Probable	Possible	<0.2

Report forms

Please note that separate red cell and microbiology reports will be issued.

Anti-D Prophylaxis

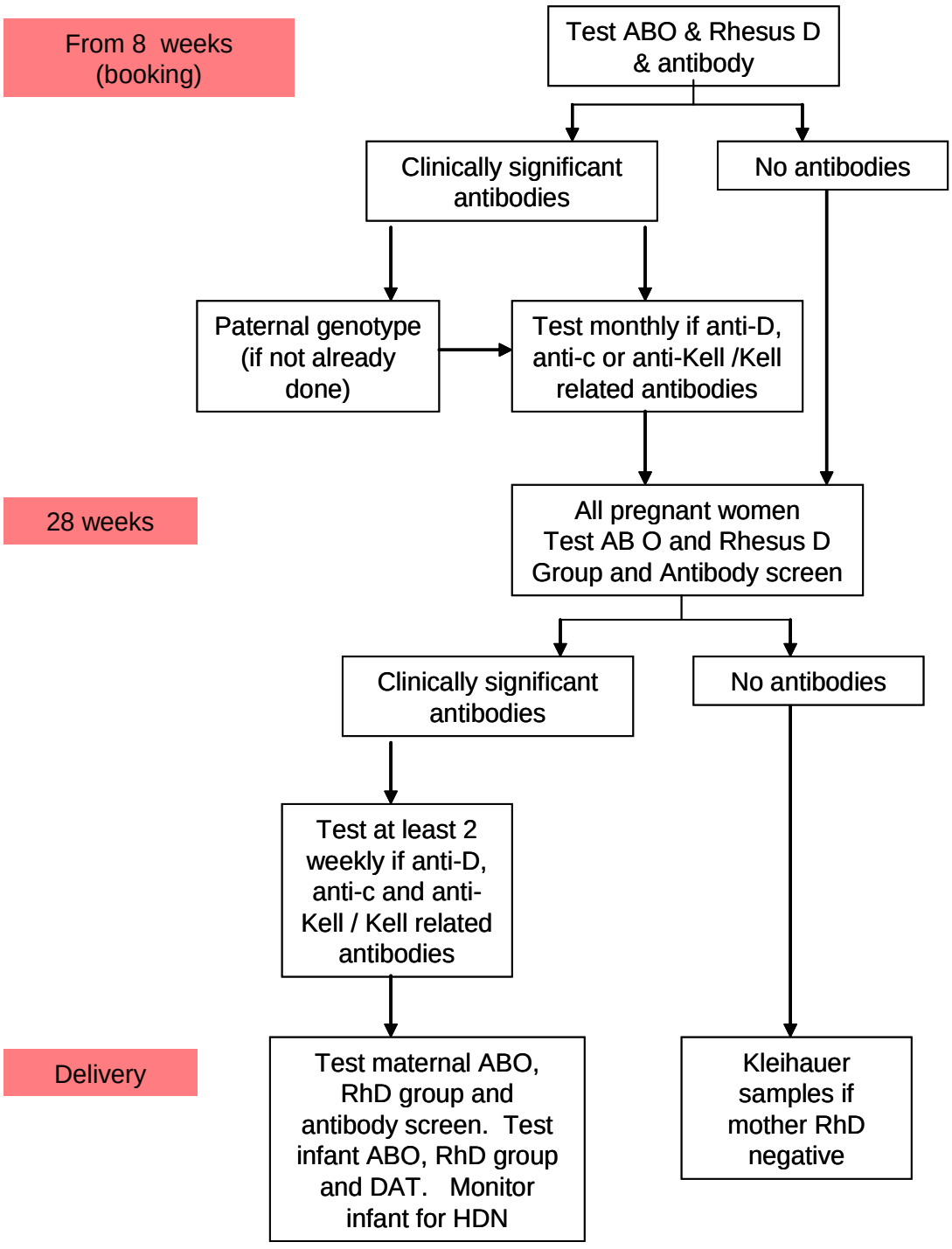
To help prevent Rhesus D haemolytic disease of the newborn injections of prophylactic anti-D are administered to Rhesus D negative women either prophylactically at 28 - 30 weeks of pregnancy or following a possible sensitising event.

The Blood Bank holds stocks 1500 IU/ml prophylactic anti-D (standard dose) that is stored in a controlled environment of 4^{o}C.

The dose of routine prophylactic anti-D (RAADP) given between 28 and 30 weeks of pregnancy is 1500iu/ml The dose of anti-D required following a possible sensitising event is determined according to the protocol LP-BB-LAB-038 Prevention of HDNB due to anti-D including FMH testing using the BD Canto II Flowcytometer.

A Flow Chart for blood grouping and antibody testing during pregnancy is shown on the page below:

Antenatal Serology flow chart



Current guidelines used in Antenatal Serology and prevention of HDN :

BCSH - Guideline for Blood Grouping and Red Cell Antibody testing in Pregnancy (2016)
BCSH - Guidelines for the use of prophylactic anti-D immunoglobulin
NICE - Routine antenatal anti-D prophylaxis for women who are rhesus D negative
NICE - Routine care for the healthy pregnant woman

Blood Transfusion Risk Management

When an incident is reported the following must be undertaken:

- Full details of all incidents must be passed to the Transfusion Practitioner.
- The Transfusion Practitioner and/or other Hospital Transfusion Team (HTT) members as appropriate will investigate the incident.
- The HTT are responsible for informing SABRE and/or SHOT of any reportable incident via the online reporting system.

Incidents must be investigated as soon as possible and:

- Appropriate corrective action taken.
- Where required, further preventative measures implemented.
- Fed back to all relevant staff.
- If the adverse event is an externally reportable incident the member of staff involved must be removed from all aspects of the transfusion procedure.
- Following full investigation of the incident the staff member(s) involved will receive appropriate training and competency assessment.
- The timeframe for reinstatement of a member of staff into the transfusion chain will be determined by the HTT following full deliberation of all the information and circumstances surrounding the incident.
- The HTT will review all incidents, and consider any changes that may be required to existing policies and procedures.
- Any changes must be communicated to the appropriate professionals in order to ensure compliance to these changes. For Laboratory staff this would be via the Q-Pulse document control system.
- All incidents are reported to the Trust Patient Safety Group