Crossmatching and Issuing Blood Components; Indications and Effects.

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Topics Covered

Taking the blood sample

ABO Group

Antibody Screening

Compatibility testing

Red cells

Platelets

Fresh Frozen Plasma (FFP)

Cryoprecipitate

Other Products

Taking the Blood Specimen

Positively identify the patient

Ask the patient to state their name and date of birth

Inpatients - Look at the wristband for the Hospital Number and to confirm the name and date of birth are correct

Outpatients – Take the hospital number from the notes or other documentation having confirmed the name and d.o.b.

Take the blood specimen

Label the tube *AT THE BEDSIDE.* the label must be hand-written

The specimen bottle should be labelled with:

First Name

Surname

Hospital number

Date of Birth

Ensure the Declaration is signed on the request form

Taking blood from the wrong patient can lead to a fatal transfusion reaction

Request Form

NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST - BLOOD TRANSFUSION

The laboratory will not process any request that fails to meet the minimum labelling requirement. ALL sections must be completed.

NHS No.	Hosp No.	Sex (Please circle) M F
Surname	Forename	DOB: D D M M Y Y Y Y
Hospital: FH RVI Ward	Consultant	☐ Private / Cat II

AFFIX PATIENT eRECORD STICKER HERE

DECLARATION - Must be completed by the person taking the blood specimen

When taking and labelling this sample I identified the patient by asking the patient to state their name and DOB and labelled the sample by handwriting before leaving the patient. For unconscious patients the 'wrist band' was used to confirm the patient's identification.

Print Name (If not requesting MO):

Signature: Contact number:

Date specimen taken: / / Time specimen taken: ..... am / pm

To be completed with/by the patient if possible or by the MO if not.

- **Have you ever been transfused here or at another hospital?**
  - a) within the last 3 months
  - b) more than last 3 months ago
  - c) Never
  - d) Not sure
- **For females of child bearing age: Are you Pregnant?**
  - a) Yes
  - b) No
  - c) Not sure
  - d) Within the last 3 months.
- **Have you ever been diagnosed, told you have or told you need:**
  - a) 'Atypical red cell antibodies' Yes / No Specify:_____
  - b) Irradiated Products Yes / No
    - I. Given purine analogues (Circle if applicable): Fludarabine, Clofarabine, Cladribine, Deoxycoformycin, Bendamustine
    - II. Given in last 6 months (Circle if applicable): CAMPATH, ATG, ALG,
  - c) Haemoglobinopathy / Sickle Cell Disease Yes / No Specify:_____
  - d) Require Phenotype Red Cell Units Yes / No Specify:_____
- **Are you aware of the risks and benefits of transfusion and have you given consent to transfusion previously?**

If not please ask for a leaflet explaining transfusion.

Make sure your sample is labelled in your presence.

To be completed by the requesting Medical Officer.

Print Name:

Signature: Contact number:

Clinical Details / Indication for transfusion

☐ **Preoperative Request:** (Please use operation codes on inside back cover)

Operation Code: _____ **Date of planned op:** __ __ / __ __ / __ __

☐ **Medical / Post Op Request:** (Please use diagnosis codes on inside back cover)

Diagnosis/Operation Code: _____

Pt. Weight: _____**Kg** **Gestation** (Kleihauer request or Neonate)**:** _____**wks**

SPECIMEN TEST REQUEST

☐ Group and Antibody Screen. ☐ DAT. ☐ Kleihauer (Not indicated <20 weeks)

☐ Other (please state): _____

COMPONENT Request – Please complete as required according to MMBOS:

Number of RED CELLS units required.

At (Time) .....

On (Date) ____ / ____ / ____am / pm

Priority

- In Theatre ☐
- Emergency ☐
- Urgent ☐
- Elective ☐

SPECIAL REQUIREMENTS – (Indication codes on reverse of form)

IRRADIATED Code

PHENOTYPED UNITS ☐ (Indicate if required)

For CMV Negative and Washed products: This MUST be discussed with the Blood Transfusion Laboratory.

For laboratory use only: GS BG NG SG Rpt AS A D DD GENO DS IH CAGG K1M FMH (Flow) Other: SRPAD/Abs. EI SERO Sign:

Transfusion Sample Timings?

Patients who have recently been transfused may form red cell antibodies. *A new sample is required at the following times before any transfusion when:*

Patient Transfused or Pregnant within the preceding 3 months:	**Sample required within 72 hours before transfusion**
Uncertain or information unavailable of transfusion or pregnancy:	**Sample required within 72 hours before transfusion**
Patient NOT transfused or pregnant within the preceding 3 months:	**Sample valid for 3 months**

ABO Group Testing

- Single most important serological test performed on pre transfusion samples.

Guidelines for pre –transfusion compatibility procedures

- Sensitivity and security of testing systems must not be compromised.

Antibody Screening

Antibody screening - the most reliable and sensitive method for the detection of red cell antibodies.

Donor units less reliable because the expression of blood group antigen varies according to genotype.

Antibody screen in advance to provide blood for transfusion.

Alerts the clinician to possible delays.

Allows lab to identify antibodies and select suitable units.

Compatibility Testing

To exclude incompatibility between donor and recipient

IAT serological compatibility test

Electronic issue

The specification and use of information technology systems in blood transfusion practise (BCSH,2014)

Selection of Groups

ABO / RhD group selected whenever possible.

Group O red cells can be given to other blood groups.

Group AB patients should receive red cells from group AB then A or B rather than group O.

RhD Positive cellular products (Red Cells and Platelets) should not be given to RhD Negative females who are under 50 yrs old (45-60).

Group O plasma should only be given to group O patients

Group A and AB plasma can be given to other blood groups

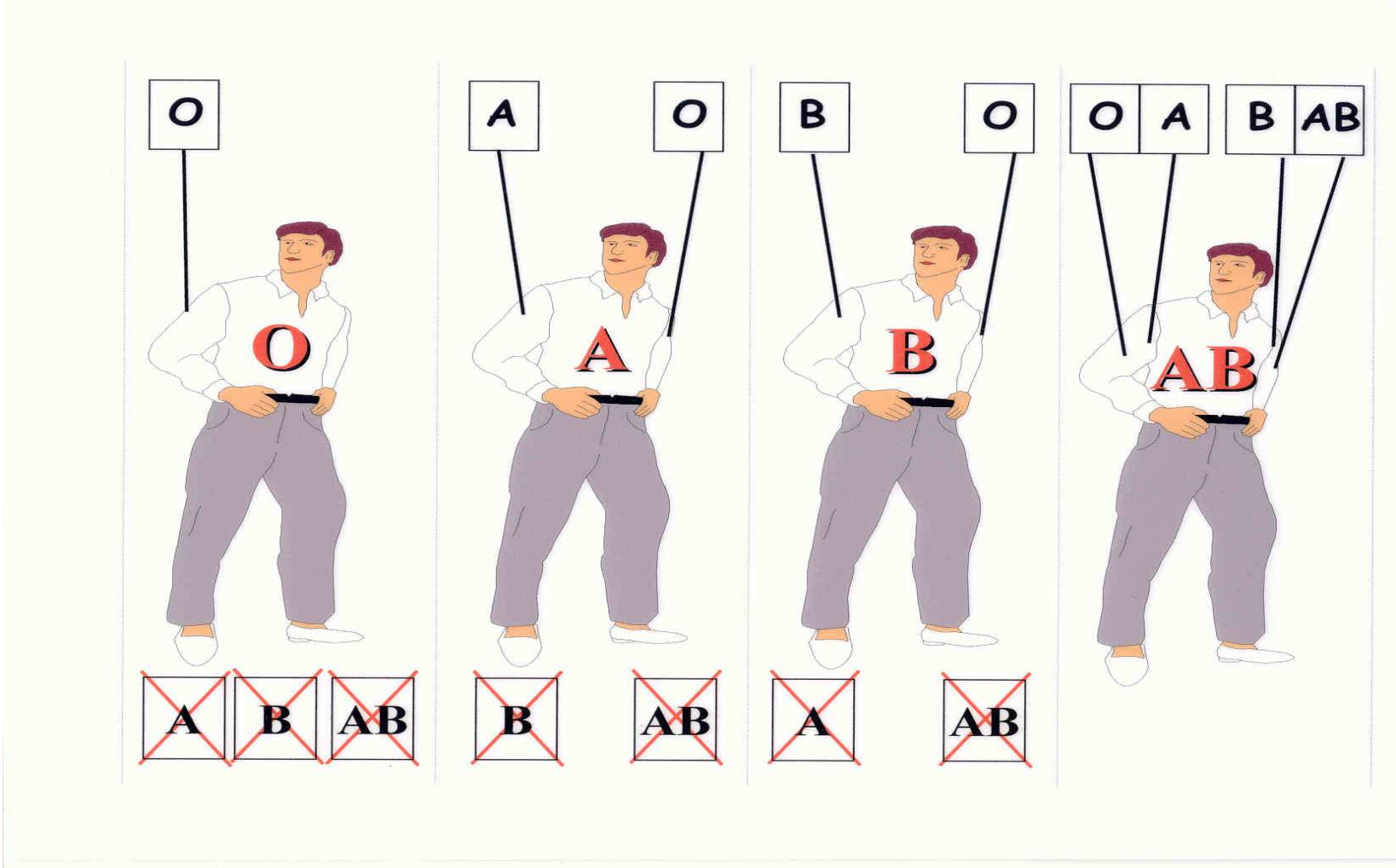
Red Blood Cells

Purpose: To restore oxygen carrying capacity in patients with anaemia or blood loss.

Average volume:	220 - 340 mL
Storage temp:	2 to 6^{o}C
Expiry:	35 days (14 days if irradiated)
Extra info:	HCT 0.5 - 0.7L/L Hb > 40g

MUST Be Compatible with ABO of recipient

Who can have what Red Cells?



Administration

A dose of 1 unit will ↑ Hb concentration by approximately 10g/L.

Many patients can be safely transfused over 90-120 minutes per unit. However, transfusions must be completed within 4 hours of removal from controlled temperature storage.

During Major Haemorrhage, very rapid transfusion may be required (each unit <5-10 mins)

Risks:

Febrile Non-Hemolytic transfusion reaction, allergic reactions, transfusion associated circulatory overload (TACO), transfusion related acute lung injury (TRALI), bacterial contamination, hemolytic reactions, alloimmunization, anaphylaxis, graft vs. host disease, hyperkalemia, iron overload, post transfusion purpura and transmission of infection.

Platelets

Purpose: Platelet transfusion is indicated for the treatment or prevention of bleeding in patients with a low platelet count or dysfunction.

Average volume:	Up to 300 mL
Storage temp:	20 to 24^{o}C
Expiry:	7 days

Extra info: ABO antigens on surface and may have reduced survival if transfused to an ABO incompatible recipient, although this is not usually clinically significant.

Preferably ABO of recipient.

Group A universal.

Give group O to group O.

Administration

A dose of 1 pooled unit would typically contain between 2.5-3 $x10^{11}$/L and should raise the platelet count by 20-40 x 10^9/L.

Transfused through a giving set not used for other components usually over 30-60 mins. Survival of transfused platelets lasts around 3-5 days.

Indications for use:

With haemorrhage: a. Aim for a platelet count of >75 x 10^9/l

b. In multiple trauma, eye or Central Nervous System (CNS) injury keep the platelet count >100 x 10^9/l

Prophylaxis: a. Platelet count <10 x 10^9/L (*except in stable patients with long term bone marrow failure)*

b. Platelet count <20 x 10^9/L in the presence of additional risk factors for bleeding (e.g. sepsis)

Pre-procedure a. Platelet count <50 x 10^9/L prior to an invasive procedure (e.g. laparotomy) *not indicated prior to bone marrow aspiration or biopsy*

b. Platelet count <100 x 10^9 /L prior to a procedure involving the CNS or eye.

Fresh Frozen Plasma

Purpose: Treatment of patients with bleeding due to multiple clotting deficiencies such as DIC, Major Haemorrhage.

Average volume:	150 - 300 mLs
Storage temp:	Below -25ºC
Expiry:	Frozen - 3 years
Thawed:	24 hours (at 4^{o}C)
	4 hours (Room Temp/unknown)

Extra info: No longer indicated for warfarin reversal.

Preferably ABO of recipient.

Group A universal.

Give group O to group O.

Administration

Dose typically 12-15 mL/kg, depending on clinical indication, pre & post transfusion coagulation tests & clinical response.

Infusion rate typically 10-20 mL/kg/hour, more rapid transfusion when treating coagulopathy in major haemorrhage (Note: patients receiving FFP must have careful haemodynamic monitoring to prevent TACO)

Indications for use:

Replacement of single inherited coagulation factor deficiencies where a specific or combined factor concentrate is unavailable eg factor V

Acute Disseminated Intravascular Coagulation (DIC) in the presence of bleeding and abnormal coagulation results

Thrombotic Thrombocytopenic Purpura (TTP), usually use Solvent Detergent FFP

Replacement of coagulation factors due to major haemorrhage.

FFP should NEVER be used simply as circulating volume replacement.

Cryoprecipitate

Purpose: Rich in fibrinogen, Factor VIII and Von Willibrand factor. Used as a more concentration source of fibrinogen.

Average volume (pool): 100 - 250 mL

(single): Approx. 50 mL

Storage temp: below -25ºC

Expiry: Frozen - 3 years

Thawed: 4 hrs (Room Temp)

Extra info: Typical adult dose = 2 pools

Group A universal.

Limited group type supplied.

Administration

A dose of two pools would typically contain between 3-3.5g of fibrinogen and raise the plasma fibrinogen level by about 1g/L.

Transfuse using a standard blood giving set over 30 – 60min per pool within 4 hours of defrosting.

Indication for use:

Acute Disseminated Intravascular Coagulation (DIC) where there is bleeding and a fibrinogen level <1g/L

Advanced liver disease when the fibrinogen level is <1g/L

Bleeding associated with thrombolytic therapy causing hypofibrinogenaemia

Hypofibrinogenaemia secondary to massive transfusion a fibrinogen level of >1.5g/L is required

Renal failure or liver failure associated with abnormal bleeding when Desmopressin contraindicated/ineffective

Inherited hypofibrinogenaemia where fibrinogen concentrate is not available.

Other Products

Irradiated – Graft versus Host Disease

Washed – IgA deficient with anti-IgA, ABOi CTx

CMV negative – assymptomatic/severe infection

Hep E Virus Negative - ??? Implemented this year

HLA matched platelets / Red Blood Cells in specific patients due to alloimmunisation.

Granulocytes

Plasma derivatives:

- Factor VIII Concentrate
- Factor IX Concentrate
- Albumin
- IVIg
- Anti-D prophylaxis