Guidelines on use of blood products

Blood Transfusion

Minimising blood loss

Avoid routine sampling. Not all babies in intensive care need daily sampling. Weekly sampling in convalescent preemies is not always necessary: ask a more senior person on ward round.

When to top up

- Sick ventilated infants - consider transfusion if the Hb falls below 120 g/l.
- In other situations transfusion will be decided on clinical grounds:
    - Oxygen dependent babies less than 28 days old should have their Hb maintained above 100g/l.
    - Oxygen dependent babies more than 28 days old should have their Hb maintained above 80g/l.
    - In babies who are not oxygen dependent there is little evidence that transfusion at Hb above 70g/l is beneficial. If the Hb is below 70g/l then transfuse if symptomatic - poor feeding, failure to grow, signs of heart failure, increasing frequency of apnoea or bradycardia.

- Always remember to check that there is blood available for pre-surgical infants.

How much

- Give 20 mls/kg with a maximum infusion rate of 5mls/kg/hour
- Diuretic cover should not be used routinely. Discuss the use of diuretics with a Consultant if the baby has chronic lung disease and is oxygen dependent or is in heart failure.
- All blood should be CMV seronegative
- Blood should be irradiated if:
    - Exchange transfusion following intrauterine transfusion
    - Top up transfusion following intrauterine transfusion
    - Proven or suspected immunodeficiency

Acute Massive Blood Loss

When dealing with an acute massive haemorrhage, e.g. exsanguination from an unclamped cord or a displaced UAC, the ultimate aims are to maintain tissue perfusion and oxygenation by restoring the blood volume and haemoglobin. Bleeding should be stopped by treating the source (e.g. compressing below umbilical stump to stop umbilical arterial bleeding) and blood component therapy may be needed to correct coagulopathy.

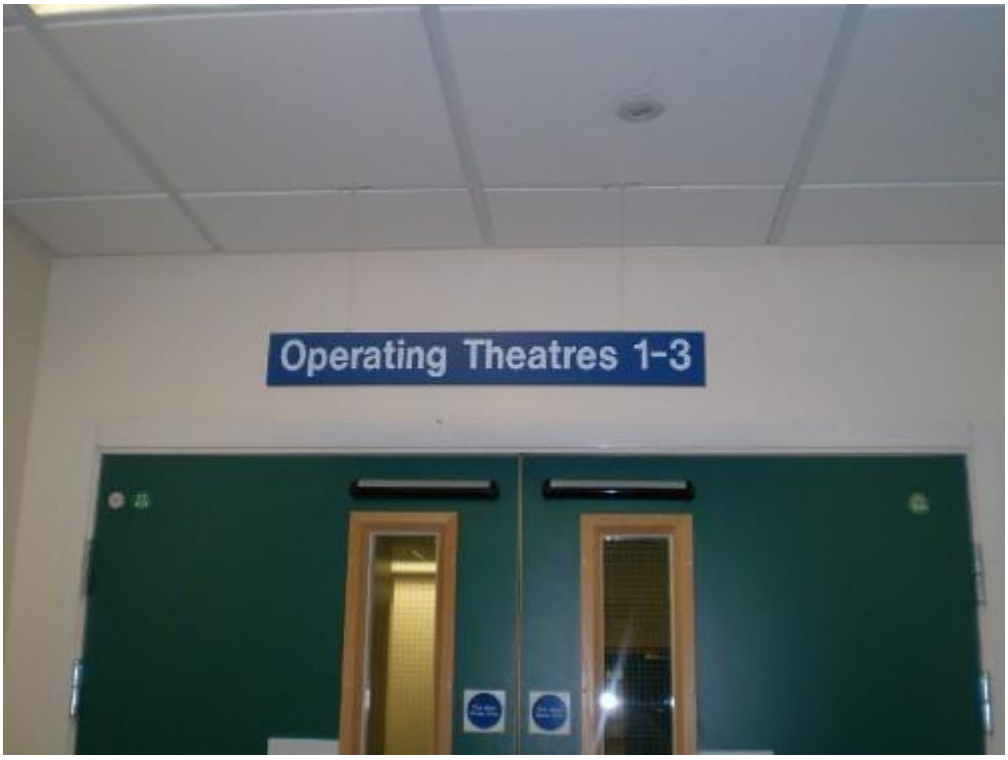
1. Call the neonatal consultant
2. If no access, obtain IV access and take samples for FBC, Group and Cross-match, Coag, U+E, ABG – send **urgently**
3. Quickly assess the need for blood – i.e. ‘needed now’ or ‘can wait 40mins for cross-matching’.
4. Delegate someone to inform BTS laboratory of the need for blood and give an indication of the timescale requirement (immediately, 10 mins etc). O negative blood suitable for a neonate can be sent out immediately, but it may be quicker to obtain from the labour ward blood fridge (see point 6). **It takes 25 minutes for BTS to manually process a new group and cross-match sample once received. If this is required, ensure a porter takes your new group sample DIRECTLY to BTS. Make sure the sample label is correctly hand-written with the 4 minimum data set points.**
5. A bolus of normal saline 20ml/kg can be given as blood products are awaited. This is safe and easily accessible.

6. If there are already acute signs of decompensation, O negative blood is needed. A supply of O negative blood (marked Emergency O negative blood) is in the blood fridge in labour ward theatres (see picture below) – you can run to and from the fridge within a minute. It is essential to sign out all blood. **Remember to inform BTS that the emergency blood has been used so it can be replenished. They will require patient name, date of birth and hospital number.**
7. Try and estimate the haemorrhage volume. The general principle is to replace this amount as quickly as it was lost. Give 20ml/kg as a bolus via a UVC if present or peripheral cannula. Monitor gas (base deficit and lactate), HR and BP (ideally invasively). If arterial access has been lost delegate someone to achieve peripheral arterial access. Assess the need for more volume. Repeat 10-20ml/kg as a bolus if required or over 30mins if stability achieved.
8. If one circulating blood volume has been lost it is good practice to recheck coagulation, but not wait for the result before continuing management. An infusion of FFP may be considered if there is continued bleeding.

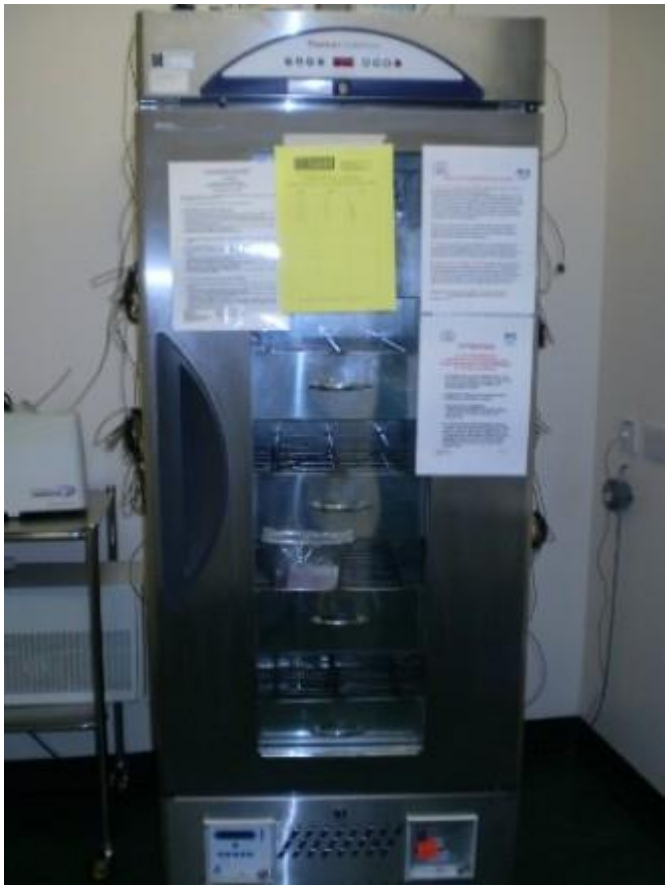
Directions to theatre

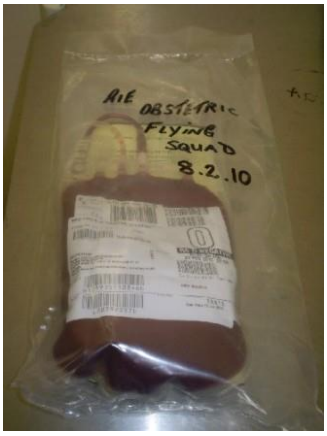
- Exit the neonatal unit by the double doors beside Salisbury Nursery.
- Turn right, towards theatre. Pass through these double doors pictured below.

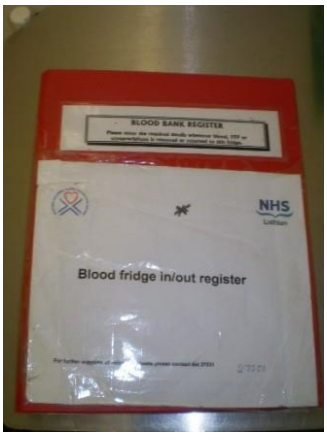
- Turn right and now pass through the double doors marked Operating Theatres 1-3 as seen below.



- A green door on the right is marked ‘Blood Fridge and Blood gas analyser’. Enter here to find the blood fridge and blood folder.







Completing the Blood Request Form

In dealing with neonates who have not yet been named, it is vitally important to complete the minimum data set - sex, surname, date of birth and unique hospital identification number. The mother's surname and first name should also be completed. If the baby is from a multiple birth, they should be identified as Twin 1 or Twin 2 etc. and this should be applied consistently to each request, even if one of the babies dies. When the child is finally named, it is important for BTS Laboratory to know that, for example, Twin 1 Smith is now Jack Smith. This will enable the staff to link the baby's previous results with the new identity.

It is important to advise the laboratory of the mother's details at the time of sending the first sample as the laboratory may have relevant details of the mother's antibody status. If you know from the antenatal notes that the mother has a red cell antibody, state this on the request form.

Administering Blood and Blood Components

Particular care should be taken in the identification of neonates. The gender of an infant lying in an incubator may not be immediately apparent and the wristband may not carry a first name. Twins and triplets may differ only in their hospital identity number. The unique hospital identity/CHI number on the baby's wristband should be checked against the blood pack and accompanying documentation when undertaking the pre-administration checking procedure.

Any infusion device used must have been tested and shown by the manufacturers to be suitable for transfusion of blood components. Syringe drivers are suitable for neonatal transfusion. Whatever kind of device is used, a suitable macroaggregate filter with a mesh size of 170-200microns must be incorporated. This may be inserted between the bag and the syringe during the syringe filling or between the syringe and the IV access device. Microaggregate filters (pore size 40micron) are also suitable but unnecessary if a 170-200micron filter is available.

Paedipacks

Infants who previously would have experienced multiple donor exposures can now receive up to 4 transfusions from a single donor. This reduces the risk of disease transmission. The infants who will benefit from this system are those receiving more than 1 transfusion within a 4-5 week period. Generally these are infants with a birth weight of less than 1.5kg or with other compounding factors e.g., necrotizing enterocolitis (NEC), sepsis etc. In the first instance the requesting doctor should specify paedipacks on the BTS form, however as a matter of routine and best practice, BTS issue paedipacks for all requests for RCC from the NNU in Edinburgh.

As all infants who have been allocated to paedipack systems will be receiving Group O red cells in optimal additive system no further samples for group and screen are required after the first sample. This will reduce blood loss and requests for further units can be made by a simple telephone call to the Hospital Transfusion Laboratory with the patient's details. There is very little plasma in these packs, minimising any plasma related hazards. The units supplied will be CMV-negative. A second sample from the infant may be required prior to the selection of a new donation (e.g., once all 4 aliquots have been used).

The paedipacks are made by sterile docking three satellite packs onto the primary red cell unit. This yields a total of 4 packs, which will have the same donation number, but also with individual product codes with a subscript of 1-4. When an infant is allocated to the paedipack system a divided donation that is within the first 7 days of its shelf life will be selected. Aliquots will continue to be issued from this time until the normal expiry date (35 days). Each aliquot will have a volume of approximately 60-70 mls. If the remainder of the donation is not in fact required for a particular infant after the first one or more aliquots have been issued the remainder of the donation will be discarded and not issued to another patient.

- Paedipacks can be issued for children up to one year old.
- All paedipacks are from accredited donors (i.e. donors who have given at least one donation in the last 2 years, which was negative for all mandatory microbiological markers).
- Infants 0-4 months receive donations first divided into paedipacks within first 7 days of shelf life.
- Infants 4-12 months can receive any age of donation however every effort is made to provide as fresh a paedipack as possible

Exchange transfusion

Neonates receiving exchange transfusion should receive red cell concentrate in plasma (not whole blood) with a haematocrit of 0.50 – 0.60. The red cell concentrate will be less than 5 days old, CMV-negative, irradiated and must not be transfused straight from 40 C storage. Monitoring of infants during transfusion is not fundamentally different from adult practice. The baseline and early checks must be undertaken. Restlessness, crying, or unexpected lethargy may all be signs of an early transfusion reaction. If there is any doubt the transfusion must be stopped and the patient assessed.

Monitoring the transfused infant

Neonates rarely develop simple non-haemolytic febrile transfusion reactions. Their temperature may rise or fall in response to a septic event and this type of reaction should be regarded as possibly septic in nature. The transfusion should be stopped and the IV access kept open until the patient can be fully assessed.

Platelet transfusion

Indications for platelet transfusion are if the platelet count is:

1. < 20 in a well baby
2. < 30 in a baby who has an additional haemorrhagic risk factor, such as:
    - <1000g and <1 week of age
    - clinically unstable (fluctuating BP)
    - has had previous major bleeding (e.g. Grade 3-4 IVH)
    - has current minor bleeding (petechiae, puncture site oozing, blood-stained ET secretions etc)
    - has a coagulopathy – refer to age matched reference ranges

3. < 50 when actively bleeding or when there is a rapidly falling platelet count, usually in the case of sepsis

In alloimmune thrombocytopenia (NAIT) the babies may have dysfunctional platelets as well as a thrombocytopenia and may warrant transfusion at a higher platelet count. Treatment should also be considered at < 50. Platelets lacking the antigen(s) the maternal antibody is active against should be given, if these are available; if not, random apheresis platelets and immunoglobulin infusion should be given.

All platelets are irradiated routinely in Scotland which is vitally important for patients requiring platelets following an intrauterine transfusion of blood or platelets. Platelets should ideally be ABO group and RhD identical with the patient; this may not always be possible, but ABO compatible platelets will be provided. If there are any doubts about compatibility, phone Blood Bank and check before giving the platelets.

Transfusion volume	15 mls/kg over 30 minutes
Type	apheresis platelets (i.e. from a single donor); paedipack
Remember	to repeat FBC in the 12 hours following transfusion to document both thrombocytopenia and transfusion in Badger

See also: Thrombocytopenia

Coagulation factors

In a neonate who is coagulopathic and:

- has a PT or APTT >1.5 x age-matched control
- is bleeding
- is about to undergo an invasive procedure

further investigation may be warranted to exclude specific coagulation factor or vitamin K deficiencies prior to specific treatment. Such infants should be discussed with the on-call haematology registrar. Consider giving pathogen reduced FFP (PRFFP) at 15ml/kg over 1 hour. For infants and neonates, group AB FFP is preferred, as it has no anti-A or anti-B antibodies.

Consider Vitamin K (Phytomenadione) if PT and APPT are prolonged. (Note that vitamin K may have been omitted in error).

Consider pathogen reduced cryoprecipitate (5ml/kg over 30mins) as a source of fibrinogen if level < 0.8.

If DIC is suspected, it is likely that all 3 products (FFP, Vitamin K, Cryo) will be required. Bleeding due to haemorrhagic disease of the newborn will need Vitamin K and FFP. Remember to recheck clotting times following administration of any product.

See also: Coagulation disorders

When to call for advice

When ordering blood and platelets (apart from in the case of NAIT) this can be done by the neonatal SHO/Registrar/ANNP directly through BTS rather than through the Haematology Registrar on call. When infants are coagulopathic it has been agreed that FFP and platelets can also be ordered without prior authorisation.

When in any doubt as to the best treatment option it is of course important to discuss cases with the on-call haematology consultant/registrar. Exchange transfusions should always be discussed and in complicated cases such as NAIT or other alloimmune problems, or when multiple products are required, the haematology consultant/registrar should be contacted for advice/input.

Safe transfusion practice

Safe transfusion education is a mandatory requirement for all staff members in this organisation who are involved in any stage of the transfusion process. The transfusion process includes:

- Making the decision to transfuse and associated communication with family
- Requesting blood components
- Taking pre-transfusion testing blood samples
- Collecting and storing blood components

- Administration of a transfusion
- Patient monitoring during and following transfusion
- Careful documentation of the rationale and procedure in the medical and nursing notes

Electronic modules (1 and 2) are available through the learn-pro NHS website (http://nhs.learnprouk.com) and their completion is mandatory. Simply register for a username/account. Print off your certificates for your portfolio/appraisal once the modules are completed and update every 18 months.

This document represents the current best practice, evidence based unit guideline and will become the standard against which our practice will be audited. It is the responsibility of all unit practitioners to adhere to the guideline and to audit compliance.

References

British Committee for Standards in Haematology. Transfusion guidelines for neonates and children. British Journal of Haematology 2004;124:433-453

British Committee for Standards in Haematology. Guidelines for the use of platelet transfusions. British Journal of Haematology 2003;122;10-23

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Poterjoy B, Josephson C. Platelets, frozen plasma and cryoprecipitate: What is the clinical evidence for their use in the neonatal intensive care unit? Seminars in Perinatology 2009;33:66-74

British Committee for Standards in Haematology. Guidelines on the management of massive blood loss. British Journal of Haematology 2006; 135, 634–641

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