Division of
Blood Transfusion Services

Ministry of Health and Family Welfare

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Administration of Blood Components

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Teaching Aims

- To perform the final bedside checks correctly and thus ensure that the administration is undertaken in a safe and efficient manner

- To understand the importance of monitoring the patient being transfused

Determine the correct IV access required for transfusion

Blood Product	Rate of infusion	IV Access
Red blood Cells	Rapid Transfusion in adults	16 to 18 G (Gauge)
Red blood Cells	Routine Transfusion in adults	20 to 22 G
Other blood products		Any size adequate
Paediatrics		22 to 25 G

- Transfusing rapidly and under pressure through too small an IV access can cause haemolysis of red blood cells.
- Ensure that the IV access is dedicated to the transfusion.
- Blood products must not come in contact with medications or incompatible solutions (e.g. D5W, HES, Ringer Lactate).

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Starting Transfusion

Before starting blood:

- Record baseline vital signs and assessment before starting each unit:
  - Temperature
  - Blood pressure
  - Pulse
  - Respiration
  - Oxygen saturation if available
  - Auscultation for patients at risk for overload (elderly, paediatric, cardiovascular disease)

Starting Transfusion (contd…)

After starting blood

For the first 15 minutes:

- Start initially with a slow rate unless transfusion is extremely urgent.
- Monitor your patient closely.

Start blood with caution as serious reactions can present early in the transfusion. Some patients are at greater risk for circulatory overload – transfuse more slowly.

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Blood Transfusion Set (BT Set)

- All blood components must be transfused through BT set containing a 170 micron filter to capture any fibrin debris.
- BT set must be changed at least every 2-4 units and at least 12-hourly during blood component transfusion.
- Note that: Platelets are best transfused through blood tubing not previously used for red cells. Platelets will adhere to fibrin captured in the filter.
- Used BT set can be a breeding ground for bacteria if stored under unmonitored condition. Do not leave it attached to the patient.

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Administration of Blood

- Identification of patient and labeling
- First half an hour patient must be under direct observation
- Blood warming not necessary
- Indication
    1. Adult patient receiving rapid and multiple transfusion
    2. Exchange transfusion in infants
    3. Children with > 15 ml/kg/hr
    4. Cold agglutinin disease
    5. Rapid infusion through central line

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Administration of Blood

- **Time limit :**
  - Less than 4 hrs; split units when required
  - Change blood filter every 4 hrs
  - Blood bag allowed to warm above 10^0C but not used cannot be reused
- **Filters :**
  - Remove blood clots & other debris, 170 micron

Rate of Transfusion

Varies with

- Blood volume /urgency of volume replacement
- Hemodynamic condition
- Cardiac status

Initially -1 ml / min smaller in pediatric pts - 4 ml/ min after 15 mins of observation

- Pediatric 10-20 ml / kg over 30-60 mins

Time limit : 4 hours; split units when required

Change blood filter every 4 hours

Platelet/FFP/Cryo – transfuse within 30 – 60 minutes

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Patient Monitoring-1

- ✓ Patient should be transfused in an area where they can be closely observed & has an access to a call button

- ✓ The procedure and symptoms of a reaction should be explained to the patient

- ✓ Encourage the patient to notify the nurse immediately if they begin to feel anxious, or if they experience any of these symptoms

Patient Monitoring -2

- ✓ Monitoring should be done for each and every unit of blood or blood components transfused
- ✓ Frequency of observation
  - Before the start of the transfusion
  - 15 minutes after starting the transfusion
  - At least every hour during the transfusion
  - On completion of the transfusion
  - 4 hours after the completing the transfusion

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Recording the Monitoring of the Patient

- Record the patient's vital signs in the patient's case notes/file
    - Temperature/Pulse/respiratory rate/BP
- Fluid balance
    - Oral and IV fluid intake
    - Urinary output
- Any adverse effects

Post transfusion Monitoring :

- Evidence of improved clinical status – Hct, Plt count, coagulation factors
- Possibility of DHTR

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Documentation of Transfusion

The record should include:

- Whether the patient and/or relatives have been informed about the proposed transfusion treatment and consent for transfusion has been obtained.
- The reason for transfusion. Signature of the prescribing clinician.

Pre-transfusion checks of:

- Patient's identity
- Blood Bag
- Compatibility label
- Signature of the person performing the pre-transfusion identity check.

Documentation of Transfusion (contd…)

The transfusion:

- Type and volume of each product transfused
- Unique donation number of each unit transfused
- Blood group of each unit transfused
- Time at which the transfusion of each unit commenced
- Signature of the person administering the blood component
- Monitoring of the patient before, during and after the transfusion.
- Any transfusion reactions.

The record you make in the patient's case-notes is your best protection if there is any medico-legal challenge later on.

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Institute of Medical Education and Research / Hospital

Blood Transfusion Sheet

Patient's Name _____Reg. No._____ Age /Sex_____

Patient's Blood Group_____

	Blood Bag Number	Blood group and Type of Blood component	Vitals before starting Transfusion	Transfusion Starting Time and Date	Vital 15 min after of starting transfusion	Transfusion End Time and Date	Vitals at The end of Transfusion	Name and Signature of person Transfusing and counter checking	Remarks/Transfusion Reaction
1st Blood Bag			Temp: PR: BP: RR		Temp: PR: BP: RR		Temp: PR: BP: RR		
2nd Blood Bag			Temp: PR: BP: RR		Temp: PR: BP: RR		Temp: PR: BP: RR		
3rd Blood Bag			Temp: PR: BP: RR		Temp: PR: BP: RR		Temp: PR: BP: RR		
4th Blood Bag			Temp: PR: BP: RR		Temp: PR: BP: RR		Temp: PR: BP: RR		
5th Blood Bag			Temp: PR: BP: RR		Temp: PR: BP: RR		Temp: PR: BP: RR		

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Risks of Poor Quality at the Bedside (1)

- ABO incompatibility: one of the major causes of transfusion-associated morbidity and mortality
- Safe transfusion depends on:
  - Accurate, unique identification of patient
  - Correct labeling of the blood sample
  - Final check of patient, product and documentation at patient's bedside

Risks of Poor Quality at the Bedside (2)

- **Defective product**
  - Bacterial contamination
  - Haemolysis
  - Loss of function
- **Safe transfusion depends on**
  - Correct storage conditions
  - Use within correct time limits
  - Inspection before infusion

Error in final bedside check –SHOT incident

- Operating department assistant (ODA) collected 1 unit of red blood cells from the satellite fridge
- Incorrect component collected: wrong name; DOB; Hospital Number
- Final patient identification check not undertaken by anaesthetist and the ODA
- Group O patient received 1 unit of Group B red cells
- Patient admitted to ICU - but died as a result of ABO incompatible transfusion

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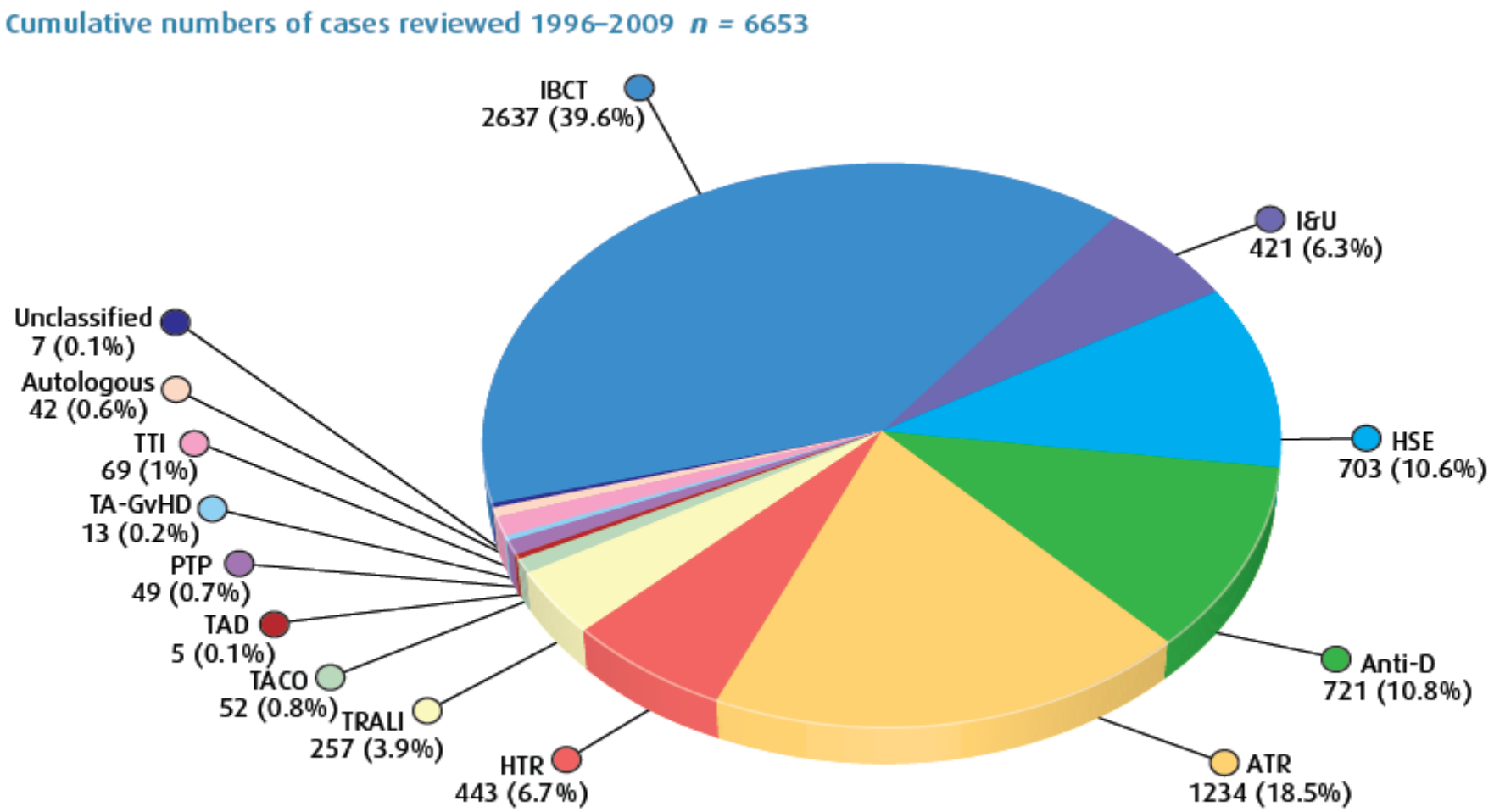
SHOT – The UK Haemovigilance Scheme: various transfusion reactions



Incorrect blood component transfusion includes

- Bedside blood administration errors
- Laboratory errors, testing and process errors
- Phlebotomy errors resulting in ‘wrong blood in tube’ (WBIT)
- Transfusion of components not meeting the patient’s special requirements (SRNM).

ABO-incompatible red cell transfusions *n = 14*

A total of 14 ABO-incompatible red cell transfusions were given,

- 10 resulting from bedside administration errors
- 2 from wrong blood in tube phlebotomy errors and
- 2 due to laboratory errors in which the wrong sample was used for crossmatch.
- **SHOT – The UK Haemovigilance Scheme: various transfusion reactions**

Vox Sanguinis (2001) **81**, 37 – 41

ORIGINAL PAPER

Sources of preventable errors related to transfusion

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Table 1 Sources of errors

Error source	*n* (%)
Outside the blood bank	
Bedside errors	99 (80%)
In-transit	8 (06-9%)
Subtotal	107 (86-99%)
In the blood bank	16 (13%)
Total	123 (100%)

- Analysis of the literature reporting the incidence of ABO incompatible transfusions ranges from one in 10 000 to one in 40 000 blood units transfused

- It has been observed that human error underlies 50% of transfusion-related fatalities

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Few Undesirable Practices

- Blood warming by hot water
- Delay in transfusing after issue from blood bank
- Use of unmonitored refrigerator for storage in nursing station
- No monitoring of rate and duration of transfusion
- Routine pre transfusion medication
- Use of transfusion set for more than one unit
- Addition of drugs to blood bag

Addition of drugs or medication to blood bag

Prohibited

Exception **:** normal saline

Change in blood: e.g. - Ringer lactate can cause clot formation - 5 % dextrose can cause hemolysis during I.V. infusion

Permissible **:** 5 % albumin, 2 % dextrose

Contraindicated **:** Ringer lactate, Hypotonic saline

Change in drug **:** pH and ionic / molecular constituent

Introduction of infection : Open system

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Transfusion Reactions

Recognizing reactions Acute transfusion reactions

Acute reactions usually occur during or up to 6 hours following the end of a transfusion and may present with:

- Fever
- Shaking chills or rigors with or without fever
- Hives or rash, itchiness, swelling
- Dyspnea, shortness of breath or wheezing
- Hypotension or hypertension
- Red urine, diffuse bleeding or oozing
- Lumbar pain, anxiety, pain at the IV site
- Nausea and vomiting
- Headache

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Transfusion Reactions

Acute Transfusion Reactions occur during and within 24 hours of transfusion

Type of Reaction	Clinical Signs and Symptoms
1. Hemolytic transfusion reaction	Fever/chills, hypotension/tachycardia, cola coloured urine, nausea, vomiting, pain in flanks/back/abdomen/chest etc.
2. Bacterial contamination	Fever, chills, hypotension, nausea, vomiting, dyspnoea and diarrhoea.
3.Transfusion related acute lung injury (TRALI)	Dyspnoea or cyanosis, fever, tachycardia, hypotension
4.Febrile non hemolytic transfusion reaction (FNHTR)	Fever, chills, rigors, cold, headache, nausea, vomiting
5.Allergic/anaphylactic reaction	Pruritis, urticaria, flushing, angioedema, hoarseness, stridor, wheezing, chest tightness, dyspnoea, cyanosis, anxiety, nausea, vomiting, abdominal cramps and diarrhoea.

Note: Signs and symptoms of various acute transfusion reactions often overlap; hence, complete workup is necessary.

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Transfusion reactions

In case of any untoward reaction

- Immediately stop the transfusion.
- Maintain IV access for treatment if necessary but do not flush the blood tubing
- Check vital signs
- Take necessary resuscitative measures to stabilize the patient.

Transfusion reactions (contd…)

- Check for clerical errors.
- Inform Blood bank staff
- Send the following samples :Blood bag with BT set, Post transfusion samples
- In case of suspected bacterial contamination: Send cultures both from the patient as well as blood bag at the bedside immediately.

Transfusion Reaction must be reported immediately to the blood bank as the blood supplier must be alerted. So that similar reactions can be avoided if possible.

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Management of Clinical Use

- Guidelines for appropriate use of blood
- Use of crystalloids/colloids/ blood substitutes
- Use of components
- Elimination of unnecessary transfusions
- Use of Autologous transfusions

Good Transfusion Practice

- A hospital transfusion committee should be established in every hospital
- The NBTS and HBB should be represented on the hospital transfusion committee
- The clinical use of blood and transfusion practices should be monitored

Role of the Hospital Transfusion Committee

- Monitor the safety, adequacy and reliability of the supply of blood, blood products and IV fluids
- Monitor the usage of blood and blood products thru' guidelines & training
- Review incidences of adverse reactions, errors taking corrective/preventive action where necessary
- Plan the future needs
- New procedures planning

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The BTS/Hospital Relationship

The BTS is responsible for:

- **Information and advice on**
  - Available products and their usage
  - Alternatives to transfusion
  - Correct storage conditions

Urgent requirement of blood

- Blood bank may issue blood before completion of routine cross matching tests if clinical condition of the patient is sufficiently urgent and delay in providing blood may jeopardize the patient's life,

- Recipients whose ABO and Rh(D) type is not known are given red cells of group O Rh(D) negative if available, otherwise O Rh(D) positive red cells are used. Cross match report indicates that XM has not been completed at the time of issue. XM continued &trans stopped if problem encountered

Urgent requirement of blood (contd...)

However, standard compatibility tests are completed promptly. If discrepancy in the result is noted, the concerned clinician is informed immediately

Few Undesirable Practices

- Blood warming by hot water
- Delay in transfusing after issue from blood bank
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- No monitoring of rate and duration of transfusion
- Routine pre transfusion medication
- Use of transfusion set for more than one unit
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Key points

- The bedside check of the patient's identification and the unit is the last opportunity to detect any unidentified errors to avoid transfusion of the incorrect blood and risk the life of the patient
- It places the practitioner in breach of professional standards and guidelines
- Due care is required to monitor the patient at the beginning , during and after transfusion
- Documentation of transfusion record is essential

Learning Outcomes

- Understand the importance of meticulous checking of the identification details of the patient and the unit being transfused
- Correctly undertake the formal pre-transfusion checks at the bedside before the transfusion of every unit to prevent any adverse event
- Develop written procedures and formats to carryout these checks
- Monitor the patient being transfused throughout the process