Learning points

- Hospital and laboratory IT systems should use compatible patient ID parameters to ensure that correct historical transfusion records are accessed rapidly and efficiently. Laboratory IT systems should be updated with special requirements and data should be transferred electronically to new systems. Systems should, if possible, be routinely updated with new rules, e.g. methylene blue non-UK FFP for patients under 16.
- Several laboratory errors were caused by failure to notice the *Special Requirements* box on the transfusion request form. The format of transfusion request forms should be reviewed to ensure this section is appropriately prominent. Electronic requesting systems should ensure completion of this section is mandatory. Laboratories should also insist on appropriate clinical details on request forms - 'anaemia' or 'pre-op' is not sufficient.
- Clinicians have a responsibility to be aware of the special transfusion needs of their patients and to ensure that local systems for notifying the laboratory are followed. Hospitals should consider implementing a system of informing the laboratory as soon as the requirement for irradiated components is identified. In the case of purine analogue therapy, routine notification of the transfusion laboratory by the hospital pharmacy is an effective safety measure, although data should be transferred at frequent intervals to prevent patients receiving non-irradiated products in the 'window period'. Where patients have several volumes of hospital notes, each should be 'flagged' with the special transfusion requirements.
- Blood request forms must be accurately completed and transfusion prescriptions must indicate special requirements.
- The final bedside check is the last barrier to mistransfusion and appears to fail in 20 to 40% of cases - research into ways of improving its effectiveness and evaluation of new technologies to improve the process is essential.
- Communication, both between clinicians in specialist treatment centres and local hospitals, and between clinical teams within hospitals, must be improved. Data on special transfusion requirements should be communicated between transfusion laboratories in hospitals that routinely 'share' patients.
- Greater emphasis should be placed on involving patients in ensuring their special transfusion requirements are met. Simply issuing 'Irradiated Component' cards to patients appears to have been of limited benefit. The introduction of a patient held booklet (analogous to the commonly used anticoagulant booklet), together with targeted education, should be considered for patients following stem cell transplantation and purine analogue therapy and would be a suitable area for clinical research and pilot studies.

5 Inappropriate or unnecessary transfusions (n=67)

Reports of these cases, in which patients received blood components unnecessarily, have increased from 56 in 2004. The underlying causes are shown in table 9. SHOT does not currently accept reports of non-compliance with guidelines on appropriate use. Such cases are difficult to assess retrospectively by a third party, and appropriate use of blood is best evaluated by well constructed prospective clinical audit such as the National Blood Service/Royal College of Physicians National Comparative Audit.

However 7 cases are included in which patients were grossly overtransfused, contributing to the death of one patient and major morbidity in another. We plan in future years to include a category of transfusion associated circulatory overload (TACO) and have included these cases in anticipation of this development.

Table 9

Site/stage of primary error leading to inappropriate transfusion

Primary error	Number
Unsuitable sample for FBC, e.g. from 'drip arm or from wrong patient (CLINICAL)	27
Also laboratory error	*6*
Also clinical (request) error	*5*
Analytical error (HAEMATOLOGY LABORATORY)	10
Also clinical (request) error	*2*
Near-patient testing error (CLINICAL)	5
FBC misinterpreted or wrongly transcribed resulting in request error (CLINICAL)	5
Wrong component/product selected (TRANSFUSION LABORATORY)	4
Wrong component collected from hospital transfusion laboratory (CLINICAL)	9
Also failure of pre-transfusion check against prescription	*15*
Overtransfusion due to clinical misjudgement (CLINICAL)	7
Total cases	**67**
Total errors	***95***

The most frequent underlying cause in this sub-category was faulty blood sampling; from a 'drip arm' in 11 cases, settled in a syringe in 3, haemolysed in 1, insufficient in 1. In a further case a sample was taken from a Hickman line, apparently using the correct technique, but was dilute. Two cases resulted from a full blood count (FBC) sample taken from the wrong patient. In the remaining 8 cases the cause of the sample error was not found. In 3 cases the haematology laboratory issued a provisional report and requested a repeat sample, but instead the patient was transfused. In 6 cases the haematology laboratory failed to investigate a large discrepancy between the current and recent result, subsequently found in 4 cases to be due to clots in the sample.

Case 13 - Faulty blood sample and lack of communication results in unnecessary transfusion.

Samples for full blood count and biochemistry were taken from a patient using a syringe, because of difficulties with venous access. The biochemistry laboratory reported that the sample was haemolysed and requested a repeat. The haematology laboratory were not alerted to the potential problem and did not notice the haemolysis. They processed the sample and issued an erroneous report, as a result of which the patient was transfused with 2 units of blood.

Case 14 - Does the clinical picture fit the laboratory report?

A female patient was admitted as an emergency with an intra-uterine death. The full blood count results and coagulation screen suggested a diagnosis of disseminated intravascular coagulation but there were no clinical signs of this complication. The ward queried the results with the laboratory and were reassured that they were genuine. Two units of red cells and 4 units of cryoprecipitate were transfused. The sample was subsequently discovered to contain clots.

A further 15 cases resulted from analytical errors, 5 of which were near-patient testing, including 2 haemoglobin results from blood gas analysers.

Case 15 - Haemoglobin result from blood gas analyser cannot be relied upon.

A collapsed patient was admitted to a coronary care unit. A haemoglobin estimation on a blood gas analyser gave a result of 2g/dL. A sample was sent to the laboratory and in the meantime 2 units of uncrossmatched group O D negative blood were transfused. The haemoglobin result from the laboratory was 10.7g/dL. The patient suffered no ill effects as a result of the transfusion.

In 4 cases, a decision to transfuse was based on a laboratory report that was either misunderstood (in one case a white cell count was mistaken by a junior doctor for a haemoglobin and in one case the red cell distribution width (RDW) was taken to be the platelet count) or wrongly transcribed (in one a mother's FBC result was written in her infant's notes).

Thirteen cases were reported in which there was apparent confusion over which blood component had been recommended and/or prescribed, reflecting a lack of knowledge of the indications, and in some cases the appearance, of components, and a lack of rigour in prescribing and administering blood.

Case 16 - Be careful how you delegate!

A haematology SpR requested platelets from the transfusion laboratory for his patient, and instructed the house officer to 'write them up'. The house officer asked a nurse how to prescribe platelets and was advised to write '2 bags FFP over 30 mins'. A different nurse, on seeing the prescription, telephoned the laboratory to request FFP, which was provided and transfused. The SpR discovered the error on finding the labelled platelets still on the agitator next morning

Learning points

- All staff undertaking phlebotomy must understand the importance of correct patient identification and correct sampling technique, and must be assessed as competent.
- Blood should only be prescribed by a doctor who has undergone training in blood transfusion and has been assessed as competent.
- Diagnostic laboratories must carry out checks to identify large changes in parameters ('delta checks') and should communicate discrepancies to other laboratories.
- Near patient testing must be subject to the same standards of validation and quality assurance as the diagnostic laboratory.

Seven reported cases of overtransfusion illustrated the difficulty of evaluating acutely bleeding patients and the importance of clinical and laboratory monitoring.

In 6 of these cases, blood loss was over-estimated and too much blood was given, contributing to one death (case 17) and one case of major morbidity (case 18). The pitfalls of blood administration to infants are illustrated by case 19.

Case 17 - wrong diagnosis leads to inappropriate transfusion.

A 62 year old female patient was admitted in a collapsed state with abdominal distension and thought to have a ruptured abdominal aortic aneurysm. A Hb result on a blood gas analyser was 15g/dL. Notwithstanding, the patient was transfused with 3 units of 'emergency O D negative' blood; the post-transfusion Hb was 18.6g/dL. She developed cardiac failure and subsequently died. The presumptive diagnosis of ruptured abdominal aortic aneurysm was not confirmed and the cause of death was uncertain.

Case 18 - importance of regular monitoring in acute bleeding.

A patient with gastro-intestinal bleeding was admitted with a Hb of 6.3g/dL. Four units of blood were prescribed. During transfusion of the third unit the patient was noted to be pale and was continuing to bleed. A further 6 units of blood were given without any interim monitoring. Following transfusion of all 10 units, the patient had a Hb of 19.6g/dL and had developed severe circulatory overload.

Case 19 - Transfusion to infants needs careful monitoring.

During a surgical procedure on a 3 month old infant, the anaesthetist was administering blood via a 3-way tap. He 'lost count' of the volume of blood transfused and the post-operative haemoglobin level was 20g/dL. The infant was venesected and survived without ill-effect.

6 'Unsafe' transfusions (n=79)

Seventy-nine patients (c.f. 54 last year) received potentially 'unsafe' transfusions - details are given in Table 10. Although these cases of handling errors are relatively low risk, the increase in reporting reflects improved vigilance and awareness of the importance of maintaining integrity of the 'cold chain' in hospital, and of adherence to national guidelines (BCSH and Handbook of Transfusion Medicine)[20],[12] on blood component handling and administration. These cases have not been analysed according to laboratory or clinical responsibility, as in many cases responsibilities for satellite refrigerators were not clearly assigned.

There was no resulting mortality or serious morbidity.