6. Incorrect Blood Component Transfused (IBCT)

Definition

The category Incorrect Blood Component Transfused (IBCT) comprises all reported episodes where a patient was transfused with a blood component intended for another patient that was incorrect in terms of its specification.

DATA SUMMARY

Total number of cases	**262**

Implicated Components	
Red cells	**201**
FFP	**11**
Platelets	**27**
Other *(specify)*	**12**
Unknown	**11**

Mortality / morbidity	
Deaths due to transfusion	**0**
Deaths in which reaction was contributory	**0**
Major morbidity	**5**

Gender	
Male	**119**
Female	**141**
Unknown	**2**

Age	
16 years+ to 18 years	**4**
1 year+ to 16 years	**14**
28 days+ to 1 year	**6**
Birth to 28 days	**15**
unknown	**0**
Total	**39**

Emergency vs. routine and core hours vs. out of core hours	
Emergency	**64**
Routine	**171**
Not known	**27**
In core hours	**82**
Out of core hours	**38**
Not known/applicable	**142**

Where transfusion took place	
ED	**2**
Theatre	**13**
ITU/NNU/HDU/Recovery	**10**
Wards	**71**
Community	**0**
Outpatient / day unit	**17**
Not known	**149**

Changes to IBCT chapter

Over the years since SHOT began reporting in 1996, the IBCT chapter has evolved and new subcategories have emerged that have been included in IBCT. These categories were not present in the original reports in 1996–97 when the errors fell into just three categories, which were:

- requesting blood and/or sampling the patient
- laboratory errors including grouping, crossmatching and labelling
- collection of blood from the storage sites (usually blood bank) and administration errors.

Categories emerging since the 2000–2001 SHOT Report are: special requirements not met, inappropriate and unnecessary transfusion, and handling and storage errors (originally called unsafe transfusion).

Special requirements not met include cases where CMV negative or irradiated components were required but not given for a variety of reasons. This still constitutes a substantive IBCT and these are included in this chapter along with failures to meet other special requirements such as phenotyped blood or methylene blue treated fresh frozen plasma (MB-FFP). However, cases of inappropriate and unnecessary transfusion are now regarded as a separate category as there is no actual evidence of an incorrect blood component being transfused. These are cases where the correct component specification has been given to the patient but where the transfusion was inappropriate and unnecessary. Likewise, handling and storage errors have now been removed from the IBCT chapter since once again these are cases where the correct blood component is transfused but where the handling or storage of the component has been incorrect prior to transfusion.

Therefore there are two new chapters in this 2008 SHOT report: *inappropriate and unnecessary transfusion* and *handling and storage errors.*

This IBCT chapter includes:

- incorrect component being given due to administration errors (wrong patient, wrong component)
- incorrect component transfused because of laboratory errors
- special requirements not met (clinical and laboratory)
- wrong blood in tube (WBIT) resulting in incorrect blood component (or patient) transfused.

The anti-D related events were reported separately as a discrete chapter (outside of IBCT) in the 2007 report and this will continue this year. Errors and adverse reactions relating to autologous transfusion and cell salvage are also reported in a separate chapter, with no overlap in the figures within this chapter.

After the four main parts of this chapter there is a section about IT errors in IBCT, which discusses the same cases that are reported in the four parts leading up to it. These are not new cases, but are discussed in the light of the IT failures that they involve or with reference to the potential for IT to be used to prevent such errors.

Reports of IBCT *n* = 477

A total of 492 cases were received on IBCT questionnaires. Some were withdrawn during the course of analysis because they did not meet the criteria of the categories in IBCT and others were classified as 'right blood to right patient' incidents in which the patient received the intended component despite a serious breach of protocol. These have been included in a separate chapter (page 66) and are not included in the total.

Therefore a total of 477 cases were included that were reported on IBCT questionnaires, which is a large (36%) increase from 2007 when 352 IBCT questionnaires were included. This represents another increase in the reporting rate with 16.8 cases reported per 100,000 components issued by the four UK Blood Services, an all-time high for SHOT reporting.

Table 18
Comparison of numbers of cases reported on IBCT questionnaires

Year	Number of cases reported on IBCT questionnaires	Reports per 100,000 components
2003	324	9.5
2004	372	11.1
2005	398	12.8
2006	323	10.6
2007	332	11.4
2008	477	16.8

Of these 477 IBCT questionnaires, 139 are reported in a separate chapter on handling and storage errors and 76 have been reported in a separate chapter on inappropriate and unnecessary transfusion.

This leaves 262 cases to be discussed in the IBCT category.

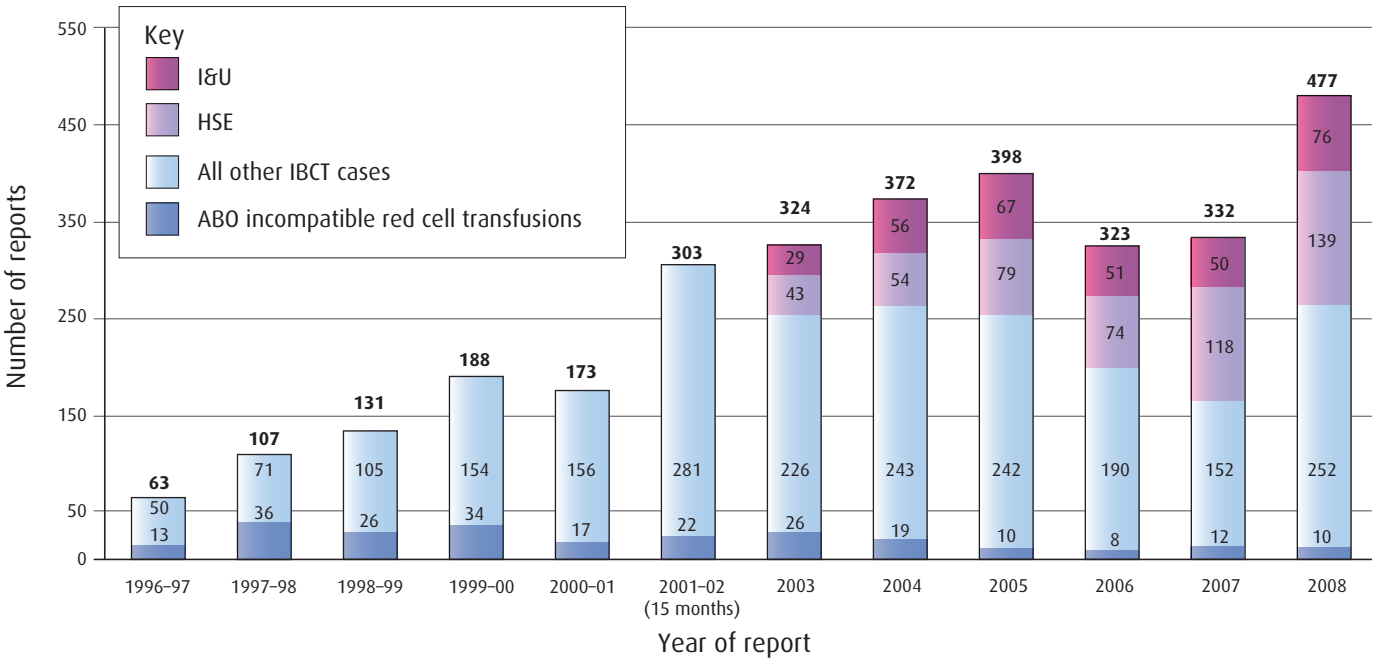
Time of day of transfusion episodes for cases reported on IBCT questionnaires

This part of the questionnaire has been poorly answered this year, as in previous years, with the section left blank in 315 questionnaires out of 477 (66%). Of the remainder, 117 took place between 08.00 and 20.00, 30 between 20.00 and midnight and 19 between midnight and 08.00.

Routine versus emergency transfusion for cases reported on IBCT questionnaires

The section regarding whether transfusions included in this chapter were routine or emergency was completed in 429 questionnaires (90%) and showed that 134 were in emergency situations and 295 were in routine or elective situations. A further 22 reported the information as not known, and in 26 the section was left blank.

Figure 6
IBCT and ABO-incompatible red cell cases 1996–2008



The histogram above shows the total number of reports in the IBCT category year by year since SHOT reporting began, as well as the number of cases of ABO-incompatible transfusion as a subgroup of IBCT cases. For this reporting year (2008) and the preceding 5 years, the numbers of inappropriate and unnecessary transfusions as well as the numbers of handling and storage errors are each shown in a different colour in the bars that represent the total reports on the IBCT questionnaires. This year, for the first time, these two categories have been separated from the true IBCT cases and are written about in a separate chapter.

Table 19
Summary of cases reported on IBCT questionnaires

Type of event	Number of cases 2007		Number of cases 2008	
Administration of wrong blood component		**24**		**47**
• ABO-incompatible red cells	9		4	
• D-incompatible red cells	2		3	
• Compatible wrong blood components	10		32	
• Incorrect component type	3		3	
• Other *(component given when not prescribed)*	0		5	
Wrong blood in tube (WBIT)		**7**		**5**
• ABO incompatible	1		4	
• D incompatible	1		0	
• Incorrect Hb	4		1	
• Compatible	1		0	
Special requirements not met – CMV/irrad		**76**		**100**
• Clinical errors and omissions	49		70	
• Laboratory errors and omissions	25		30	
• Blood Service errors and omissions	1		0	
• Unclassifiable	1		0	

Special requirements not met – other • Laboratory related cases • Clinical related cases	 15 2	**17**	 11 6	**17**
Laboratory errors *(excluding special requirements not met)* • Wrong blood issued • Wrong ABO/D type for SCT patient • Pre Tx errors – testing • Pre Tx errors – procedural	 15 5 5 15	**40**	 39 4 8 40	**91**
Miscellaneous IBCT		**0**		**2**
(Sections below formerly IBCT, now in separate chapters)				
Inappropriate and unnecessary transfusion • Based on wrong Hb (platelet or coagulation) result • Based on POCT INR/platelet count • Haem/coag laboratory errors • Poor knowledge and prescribing	 28 2 3 17	**50**	 38 3 10 25	**76**
Handling and storage errors • Technical and administration errors • Transfusion of expired red cells • Excessive time to transfuse • Cold chain errors (including 20 laboratory-related)	 15 12 57 34	**118**	 9 45 24 61	**139**
TOTAL		**332**		**477**

Summary of key data for true IBCT cases *n* = 262

Mortality entirely related to IBCT event *n* = 0

There were no fatal cases resulting directly from ABO-incompatible transfusion or other IBCT this year.

Mortality in which IBCT event contributed *n* = 0

There were no IBCT cases this year in which the transfusion contributed to the death of a patient.

Major morbidity *n* = 5

There were 5 cases of major morbidity arising from ABO-incompatible red cell transfusion. This consisted of 2 acute HTRs from erroneous bedside administration of ABO-incompatible red cells, 2 acute HTRs from ABO-incompatible red cells given following a phlebotomy error resulting in 'wrong blood in tube' (WBIT), and 1 case of acute HTR resulting from a laboratory error.

ABO-incompatible transfusions *n* = 11

A total of 11 ABO-incompatible transfusions were given in 2008, which included 10 ABO-incompatible red cell transfusions. Four of these cases arose from bedside administration errors, 3 from WBIT phlebotomy errors and 3 from laboratory errors. This figure remains very low despite the great increase (from 164 to 262) in the number of true IBCT reports in 2008.

There were no cases of incompatible platelet or FFP transfusion resulting from clinical errors, but 1 transfusion of ABO-incompatible FFP resulting from a laboratory error.

D-incompatible transfusion *n* = 17

There were 17 D-incompatible red cell transfusions in 2008. Three arose from administration errors and 14 from laboratory errors. These consisted of 10 D typing errors, 3 component selection errors and 1 incorrect group issued following a mismatched stem cell transplant. There were none from WBIT errors.

Administration of wrong blood *n* = 47

Overview

In this subcategory 42 questionnaires were received; none were transferred out of the section and 5 were transferred in from the inappropriate and unnecessary transfusion section. In these 5 cases a blood component was administered that had not actually been prescribed, because of a failure of bedside checking.

This section therefore describes the main findings from 47 completed questionnaires.

Of these 47 cases, 18 occurred in male patients and 28 in female patients with gender not given in 1 case.

A total of 8 reports involved patients under 18 years old. Of these, 5 patients were aged under 28 days, 2 were between 1 year and 16 years, and 1 was between 16 and 18 years. Two paediatric patients received the incorrect component type, and the remaining 6 paediatric patients received the wrong red cells, which happened to be compatible.

Table 20
Number of wrong blood episode in emergency and routine situations

Emergency	13
Routine	27
Unknown	7

Table 21
Number of wrong blood episodes occurring in core hours and out of hours

In core hours 08.00–20.00	26
Out of hours 20.00–00.00	10
Out of hours 00.00–08.00	11

Mortality and major morbidity

There were no fatalities directly due to administration of wrong blood, and there were 2 cases of major morbidity (see cases 3 and 4).

Blood component collection

A total of 29 of the 47 cases involved the initial collection of the incorrect unit from the blood bank issue refrigerator, followed by failures of all subsequent barriers to administration of wrong blood components, in particular the bedside component against patient ID check.

Table 22
Staff responsible for the collection of the incorrect unit from the blood issue site

Registered nurse or midwife	15
Porter	8
Unqualified nurse	1
Health care assistant	1
Operating department assistant	1
Housekeeper	1
Anaesthetist (doctor)	1
Unknown	1

Without denominator data it is hard to draw inferences but, as errors commonly occur at this stage in the process, it must be seen as a 'weak link'. Strategies need to be put in place to ensure that personnel who collect units of blood from the blood issue site are fully trained, competent, aware of the critical nature of the tasks involved, and able to take personal and professional responsibility. Only 16 of these 28 staff were reported to have received training.

Errors included:

- using documentation from the wrong patient
- using incomplete or inadequate documentation
- taking documentation of 2 patients at once, causing confusion
- not checking details of all patient identifiers against unit being collected

An electronically locked issue refrigerator would prevent some of these errors, although such systems can be bypassed or overridden.

Bedside checking

All cases in this section could have been prevented by a properly carried out bedside check of the patient ID wristband against the unit. The check was either absent altogether, or had supposedly been completed using various items of paperwork plus the unit of blood, but excluding the patient themselves (either verbally, or by the wristband attached to the patient). Frequently the 'bedside' check had been carried out remotely from the patient, in another room, or at the nurses' station. A worrying recurrence in the wording of reports to SHOT is 'the check was completed in the treatment room, but unfortunately the nurse then connected the unit to the wrong patient'. It is of course not possible to complete the checks in the treatment room, unless the patient is in there, but some reporters seem unclear about this.

Additionally, failure to read the prescription chart has resulted administering the incorrect component in 4 cases, and a component where none had been prescribed in 5 cases.

In 9 cases the unit was correctly checked against the patient ID wristband – but errors still occurred from misreading the band, from the patient having two ID bands on different limbs bearing different details, or from the band not being attached to the patient at the time (and belonging to another patient). In some cases where a correct ID check was carried out, the patient received the wrong component type, or one which had not been prescribed.

Table 23
Bedside checking errors

Unit checked against compatibility form	18
Unit checked against patient's notes	2
Unit checked against prescription chart	2
Patient asleep so did not give antibody card	1
No bedside ID check performed	16
No details given	1
Unit correctly checked against patient ID band	7
TOTAL	**47**

Table 24
Number of staff involved in final check

Single-person check	13
Two-person check	33
No detail	1
TOTAL	**47**

Anecdotally, 2 person checks are used more frequently throughout the UK, despite the recommendations given in the BCSH blood administration guidelines, 1999.[6] There were 34 trusts where 2-person checks are carried out according to local protocols, while 13 trusts conducted single-person checks as standard. In 1 case the administration of a wrong component has led a trust to consider changing from 2-person to single-person check.

Table 25
Grade of staff involved in bedside checks

Grade of staff	First checker	Second checker
Registered nurse / midwife	42	27
Operating department practitioner	1	0
Junior doctor	1	2
Consultant	2	3
Locum / agency staff	1	1
Unqualified nurse	0	1
TOTAL	**47**	**34**

Registered nurses and midwives conduct the majority of pre-transfusion checks prior to blood component administration, but in emergency or theatre situations others become involved in this process.

Erroneous administration of ABO-incompatible red cells *n* = 4

This is the lowest number of ABO-incompatible red cell transfusions reported in a year since reporting to SHOT began in 1996. This is notable since the overall number of IBCT reports in 2008 is at an all-time high, having risen by 36% since 2007.

In all 4 cases the error started with the collection of the incorrect unit from the blood bank issue refrigerator. Interestingly the personnel involved were 2 porters, 1 'housekeeper' and 1 registered nurse. The error during the collection process was further compounded by errors and omissions during the checks prior to administration.

Three of these 4 patients subsequently died, but the mismatched transfusion was not considered to cause the death or to contribute to it in any of the cases.

In Case 1 there was development of respiratory problems (but no haemolysis), which was thought to be unrelated to the transfusion, and in Case 2 there was no clinically discernable reaction. Both of these patients died of unrelated causes.

There was major morbidity in Case 3 and Case 4, with evidence of an acute haemolytic transfusion reaction. One patient subsequently died of unrelated causes, and the other recovered with no long term sequelae.

Case 1
Lack of understanding of what a patient ID check involves, and why

A 67-year-old female haematology patient in a side room was prescribed a transfusion. A trained 'housekeeper' took the correct patient documentation to the blood refrigerator but collected a unit for another patient with the same first and last name. The details on the pack were checked against the accompanying compatibility form and the signing out ledger, but not with the documentation brought down for the ID check. A similar error took place on the ward, in which the red cell unit was 'checked' by 2 registered nurses against the compatibility form outside the patient's room. A nurse entered the room and administered the transfusion without a bedside patient ID check. The transfusion record sheet for the patient was signed by the 2 members of staff stating that all checks had been completed satisfactorily. The error came to light when the blood for the intended recipient was found to be unavailable. The patient developed respiratory problems several hours later but was already severely ill and died later the same day. The patient was group O D positive and received a whole unit of group A D positive red cells. There was no record of haemolysis, and imputability was placed at between 0 and 1.

Case 2

No patient ID check even when administering non-group O units believed to be group specific

A 77-year-old man with a ruptured abdominal aortic aneurysm was admitted via the ED straight to theatre for emergency surgery. An anaesthetist collected what he thought was emergency group O D negative blood from the theatre satellite refrigerator, which was in fact group B D positive blood issued for a specific patient. This anaesthetist then handed the unit to a second anaesthetist who administered it believing it was group specific, but no appropriate ID check was carried out. Group specific units were soon issued from blood bank for the patient, who was group A D positive. The error was then detected by a consultant anaesthetist who spotted the different blood group of the new units labelled for this patient. There was no evidence of a transfusion reaction or haemolysis, and the patient died as a result of his ruptured aneurysm.

Case 3

Acute haemolytic reaction in frail 91-year-old man administered ABO-incompatible red cells

A 91-year-old male patient who had sustained a head injury and intracranial bleed was prescribed a transfusion that was administered after midnight. The incorrect unit of red cells was collected by an untrained, registered nurse. Pre-transfusion checks were conducted by 2 registered nurses against the compatibility document, which was signed, timed and dated. The patient was wearing a wristband ID but this was not used in the checking process. The patient was group O D positive and he received group B D positive red cells intended for another patient. After 100 mL had been transfused he became agitated and pyrexial and the transfusion was discontinued. He deteriorated with hypotension (BP 70/40), haematuria and abdominal pain together with cardiac problems and died 9 days later. The coroner concluded that death was due to causes other than the transfusion.

Case 4

Lack of positive ID check at collection and administration

A 92-year-old male patient with a GI haemorrhage was prescribed a blood transfusion in the ED. Correct documentation was taken to collect the unit, but was not used to identify the unit at the issue refrigerator. The incorrect unit was collected and was checked by 2 staff nurses against accompanying paperwork, but not checked against any other patient ID, as the patient did not have wristband ID attached and was unable to participate in the checks himself. The patient was group B D positive and the unit commenced was group A D positive. After 50 mL the patient developed an acute reaction and the transfusion was stopped. He developed haemolysis and but recovered fully

As discussed above, in all 4 of these cases the first procedural error, of collection, was followed by a second error of bedside checking, thus allowing the transfusion of ABO-incompatible red cells to go ahead. The repeated use of the compatibility form (or other paperwork) as the identifier for the patient is very worrying, as it betrays a lack of understanding of the purpose of the bedside patient ID check.

Erroneous administration of D-incompatible red cells *n* = 3

D positive red cells were given erroneously to 3 patients who were D negative. In 2 cases no patient ID checks were performed; in 1 the paperwork was signed at the nurses' station by nurses in a hurry, and in the other – an emergency – blood delivered in a transport box to the ED was assumed to be for the haemorrhaging patient only. In a third case the bedside ID check against the wristband was performed correctly, but the unconscious patient had 2 wristbands bearing 2 different patients' details.

Case 5

Lack of ID checks at patient's side

A haematology patient required a second unit of red cells, so the registered nurse looking after the patient co-opted a second registered nurse to do the patient ID check. All the documentation was competed and signed by both nurses at the nurses' station. The first nurse then took the unit into the 6 bedded bay alone, and administered the blood to the patient opposite the one for whom it was intended, without a bedside ID check. A group A D negative patient was thus transfused with a unit of group O D positive red cells. No transfusion observations were conducted. Both nurses had received transfusion training within the previous 12 months.

Case 6

One patient – 2 wristbands – one of which contained details for another patient

A 69-year-old male patient was in ITU unconscious following major surgery. The patient had a wristband on each wrist, one of which contained details for another patient. The correct checking procedure was completed at the bedside, but the patient's identification was taken from the wrong identification label on his wrist. The patient, who was group A D negative, received a unit of group O D positive red cells intended for another patient.

Case 7

No patient ID check made in emergency situation when box of blood for 2 patients delivered to ED

Blood for 2 patients was sent in the same box from blood bank to the ED. A 37-year-old male trauma patient required urgent transfusion and blood for a different patient was taken from the box and administered by an anaesthetist without checking the details of the patient in any way. Each member of staff thought the other had performed ID checks. The patient, who was group O D negative, received a group O D positive unit. He died due to his major trauma.

Wrong blood components transfused that happened to be compatible *n* = 32

There were 32 cases in which errors similar to those described above took place, but serendipitously the incorrect components transfused were ABO and D compatible with the patient transfused. All but 2 of these cases involved red cells, 1 involved platelets and 1 involved FFP.

There was 1 case in which the recipient required CMV negative, irradiated red cells; the wrong unit transfused was ABO and D compatible, but did not meet the patient's special requirements.

Incorrect use of documentation when collecting blood components from the issue refrigerator, and absence of bedside patient ID checks (replaced with remote signing of paperwork) are recurrent problems in this group of cases. In addition there are some cases in which another patient's crossmatched units have been mistaken for emergency (or flying squad) group O D negative units, and transfused without any further checks.

Six of the 8 paediatric blood administration cases are in this section, including 4 under 4 weeks of age with 3 involving transfusion to twins. One of these involved transfusion of platelets intended for a 10-year-old child to another child in the same ward: both patients were group A D positive.

The number of wrong blood transfusions that were compatible may point to an emphasis on checking of the patient group and little else. Certainly one would expect approximately 1 in 3 units, if given randomly, to be ABO incompatible.

Case 8

Incorrect documentation used to collect red cells from issue refrigerator

An anaesthetist asked an ODP to collect 2 units of blood crossmatched for the patient in theatre. The ODP filled out a 'Blood Collection Form' with details from a wristband left in the anaesthetic room, assuming that this wristband was from the patient in theatre. In fact, the wristband had been removed from a patient on the previous list. The ODP gave the form to a theatre support worker who correctly collected the units of blood named on the form. The anaesthetist checked the label on the unit of blood against the accompanying compatibility report only and did not check the patient ID on the blood unit against the patient's wristband. The patient was group O D positive and the unit administered was group O D negative.

Case 9

Bedside check omitted in favour of a treatment room check

Forms and documentation for a transfusion were completed and signed by 2 registered nurses in the treatment room. One of the nurses then took the unit and connected it to a different patient, also awaiting transfusion, without a bedside patient ID check. A little later blood was being prepared for transfusion to this patient, who was found to already have a transfusion running, so the error was discovered. Both patients were group B D positive.

A sentence that appears in several reports of blood administration errors states: 'They checked unit in the treatment room and completed the documentation appropriately', which, as discussed above, implies that there are still widespread misconceptions, in spite of training and competency assessment, about what the pre-transfusion checking and signing process is actually there to achieve.

Case 10

Incorrect units collected in place of emergency group O D negative blood

A patient was rushed to maternity theatres for a Caesarean section as she was starting to haemorrhage. The anaesthetist requested emergency group O D negative blood. A midwife, who had received transfusion training, went to the maternity theatre's satellite blood refrigerator and collected 2 units of blood from the top drawer without any checks, assuming it was the emergency blood. The 2 units of red cells were given rapidly. The anaesthetist commented that the blood was group O D positive, but as the patient was group A D positive, the anaesthetist was happy it was compatible. It was only when they took it down that they realised the blood was allocated to a patient, and was not the emergency blood.

Case 11

Lack of recognition of paediatric emergency units, and adult crossmatched units used instead

A neonate required emergency transfusion and 20 mL was administered from a unit of group O D negative red cells removed from blood bank by a registered midwife who had not received training. The unit was not labelled for emergency use, but was labelled for an adult patient on the maternity unit. The bedside check was not done and the blood was not signed out of the blood bank. The blood bank was stocked with 2 emergency group O D negative Octapacks suitable for neonates, which were not used. The baby died the same day, unrelated to the transfusion.

Incorrect component type given to the correct patient *n* = 3

In these cases the wrong components were administered against a prescription that clearly stated the required component, highlighting a lack of knowledge of component types and their appearance among staff involved in the collection and transfusion of blood components.

In 1 case, red cells were administered in place of platelets, and in 1 case FFP was given instead of platelets. A child 11 days old received FFP instead of platelets.

Case 12

Red cells administered instead of platelets

A unit of platelets was prescribed for administration overnight, with a further unit of red cells to be given in the morning. Although the staff nurse believed she had given a unit of platelets, she had collected and transfused a unit of red cells, administering the component over 50 minutes as per the platelet prescription. The prescription form was completed with confirmation of bedside checks. When questioned, the nurse stated she did not know the difference between a bag of red cells and a bag of platelets.

Case 13

FFP administered instead platelets

Red cells, platelets and FFP were ordered although there was no clinical indication for FFP written in the notes. The patient was prescribed platelets but FFP was collected in error from the blood bank by a porter and administered to the patient instead. The error was not realised during the 2 person bedside check. It only came to light when blood bank contacted the ward to ask why the platelets had not been used.

Case 14

FFP administered instead of platelets

FFP, red cells and platelets were requested for a patient 11 days old with sepsis. Platelets were prescribed by the doctor, but a registered nurse mistakenly collected FFP from the laboratory blood refrigerator. The nurse was reported as looking for a non-cellular component and seeing the FFP in the refrigerator, thought this was platelets. The nurse signed in the register for platelets, even though the donation number was different. The unit of FFP was transfused on the ward following checks by 2 registered nurses, thinking that this component was platelets. The error was noticed the next day by the BMS when platelets for the patient were found in the platelet agitator.

As well as demonstrating a lack of knowledge about component types among the personnel collecting and administering blood components, it is clear that these errors would still have been prevented if complete and thorough checks of unit type and number had taken place at the time of collection or at the bedside prior to administration of the units.

Transfusion of component to correct patient but without a prescription *n* = 5

In these cases components were transfused without having been prescribed, or authorised, by the clinicians in charge of the patient's care. The issue here is not the recognition of different components, but the omission to check the component had been prescribed before administering the blood component. The components were all for the correct patient.

Three cases involved transfusion of red cells, and 2 transfusion of platelets. In 1 case of red cells and 1 of platelets, a unit in excess of the number prescribed was administered. In 2 cases no clinical decision to transfuse had been taken, and no prescription or authorisation made, but nursing staff transfused red cells that were available from blood bank. In the final case, red cells had been prescribed and given and a decision about platelet transfusion deferred to the next day. However, they were erroneously collected and transfused.

Case 15

Platelets for planned administration the next day administered without prescription a day early

Platelets had been ordered for an 11-year-old child for administration the following day, pending a final decision (and prescription) on the ward round. Two units of red cells had already been transfused, but the porter collected the platelets too. The platelets were given by a registered nurse without a prescription.

Volume of incorrect blood component transfused

As shown in Table 26 below, the error was recognised soon after the component was connected in 15 cases in which < 50 mL was transfused. In several cases the reporter commented that due to saline being present in the giving set, it was considered that the patient was not actually exposed to the wrong component. In 1 case this meant that practitioners felt able to change the giving set and transfuse the unit to the correct patient. There were 2 such cases in the 2007 SHOT report. Even if exposure is uncertain these cases should still be reported.

Table 26
Volume of wrong component administered (mL or units)

Volume given	Number of cases
< 50	15
50–99	3
> 100	5
Whole unit	21
> 1 unit	3
TOTAL	**47**

There are 21 cases in which the whole unit was transfused and a further 3 in which more than 1 wrong unit was administered. It is a concern that over 50% of administration errors are not recognised until the transfusion of the unit or units is complete.

COMMENTARY on component administration errors

There has been an increase in the number of reports of administration errors this year, as well as a decrease in the number of ABO-incompatible red cell transfusions, and the number of serious outcomes (death due to transfusion and major morbidity).

The types of error reported have not changed, except that this year there are 5 cases reported in which components were given without any prescription – this category has not emerged so explicitly previously.

Lack of underpinning knowledge of the rationale behind the required steps of the blood administration protocol still accounts for many of the errors reported, and in many cases the reporter pointed out that the staff involved had successfully completed training and competency assessment within the previous year. The content of training and assessments is crucial to their success. Performing of the correct tasks will only occur reliably when practitioners understand what they are aiming to achieve and why, whereas adherence to a complex, but apparently meaningless, series of tasks will break down very rapidly under pressure.

A transfusion checklist may be a useful adjunct to the blood collection and administration procedure. This report describes errors in every possible step of the process from blood leaving the issuing laboratory, to its administration to the patient, including:

- BMS handing incorrect unit to person collecting component
- wrong patient documentation brought to laboratory to collect component
- correct documentation brought but not used
- misreading of documentation
- transportation of several patients' components together
- failure to recognise correct component type
- inappropriate checking of documents against unit
- signing documentation remotely from patient
- absence of any bedside patient ID check
- failure to consult prescription
- incorrect ID attached to patient
- unlabelled patient asleep or unconscious

However, it remains the case that a properly conducted final bedside check of the patient's ID against the unit to be transfused would prevent every case, with the possible exception of the case in which a patient was wearing 2 different ID wristbands.

While professional responsibility must be taken at every stage by the personnel involved, the final barrier to wrong blood administration is at the bedside, and this cannot be over-emphasised. Patient identification is at the root of a large number of errors in hospitals – not only in transfusion practice, but in drug administration, investigations, operative procedures and so on. It is essential that formal bedside patient identification becomes second nature to all healthcare personnel whenever they are involved with delivery of individualised patient care.

Learning points

- Patient ID should be confirmed with the patient or carer on admission, ensuring that names, date of birth and hospital number are correct, and that a search for previous records is carried out.
- Wristbands must be issued and worn, and should contain standard patient ID details in accordance with NPSA SPN 24 (standardising wristbands improves patient safety).[7]
- A bedside check between the patient's ID wristband and the label on the blood component is essential to prevent component administration errors. Any other checking or signing of documentation is secondary and does not constitute the patient ID check. If there is no wristband the transfusion should not commence.
- Documentation of the prescription must be available, the component prescribed, the dose and rate of transfusion given, and any special requirements, and this must be checked and signed by the staff administering the blood component transfusion However, this does NOT constitute the bedside patient ID check (above).
- Pre-transfusion baseline observations must be documented, and the patient must have observations at 15 minutes and regularly throughout the transfusion. It must be possible to observe the patient easily in the ward.

Wrong blood in tube errors (WBIT) *n* = 5

These cases occur when the sample tube is labelled correctly for a patient, but in fact contains a blood sample from a different patient. This may affect samples either for a group and crossmatch, or for haemoglobin (FBC) or both. This year there are 3 cases involving the transfusion of large volumes of ABO- incompatible red cells. Two of these involved phlebotomy of the wrong patient preoperatively, 1 by a doctor and 1 by a phlebotomist. One of these cases caused an acute haemolytic reaction, which was not recognised as such at the time. In the third case the ABO-incompatible transfusion had taken place 11 years earlier, and came to light on the current admission. Again, an acute reaction had occurred but was not recognised as transfusion related at the time. In a fourth case a junior doctor had bled the wrong patient, and ABO-incompatible red cells were crossmatched, but luckily not given. Platelets and FFP were given – including group A platelets to this group O patient, with potential poor increment, but no reaction. A fifth case involved the incorrect patient being bled (unclear by whom), resulting in an incorrect low haemoglobin level and an incorrect group assignment, fortunately group O. The patient was transfused unnecessarily as he was not anaemic, but the units given were compatible with his actual group, which was group AB D positive.

There were no cases of D-incompatible transfusions reported in this group this year.

In 2 cases the samples were taken from the wrong patient by a junior hospital doctor; in 1 case a phlebotomist bled the wrong patient, while in 2 cases it is not recorded who took the samples.

Case 1

Doctor's phlebotomy error results in 2 unit ABO-incompatible transfusion

An elderly patient was bled and grouped as group B D positive and transfused with 2 units of B D positive cells because of anaemia (cause not given). This patient had been bled by a doctor during normal working hours. A subsequent sample that grouped as A D positive was rechecked and proved to be the correct group. The wrong patient had been bled when the original sample was required. Fortunately the patient did not suffer any ill effects from 2 units of ABO-incompatible blood.

Case 2

Phlebotomist's patient ID error results in 3 unit ABO-incompatible transfusion

An elderly gentleman required an amputation for gangrene and was grouped as B D positive, and 3 units of this group were given to him in the perioperative period. A postoperative sample taken a few days later prior to a laparotomy grouped as O D positive. The patient had in fact suffered some respiratory problems, further anaemia and hyperbilirubinaemia following his original transfusion, but these had been attributed to his multiple comorbidities and possible fluid overload. The patient died of complications unrelated to his ABO-incompatible transfusion. The incorrect sample taken from the wrong patient had been taken by a phlebotomist.

Case 3

Acute HTR from ABO-incompatible transfusion comes to light 11 years later

The patient, an elderly male, grouped as O D negative, which was discrepant with his original blood group recorded in the computer system 11 years earlier as A D negative. Further investigation revealed that 11 years earlier he had received 2 units of group A D negative blood resulting in a haemolytic episode with renal failure requiring dialysis. A full recovery was made and it is not clear from the records whether at the time the transfusion was implicated in this reaction. It is now established that the patient is group O D negative.

Case 4

Doctor's phlebotomy error in emergency situation

A middle-aged man with hepatic failure and perforated ulcer grouped as A D positive and 6 units of red cells were crossmatched and 10 units of FFP and 2 units of platelets were issued, all group A D positive. The FFP and platelets were given but fortunately the red cells were not. Subsequent samples revealed that the patient was in fact group O D positive and the doctor had bled the wrong patient. The patient suffered no reaction.

Case 5

Incorrect Hb level and group following patient ID error

A middle-aged gentleman with brain metastases and seizures had samples taken for a repeat haemoglobin and a group & save, which revealed that his haemoglobin had dropped from 13.7 to 8.9 g/dL. The patient was therefore crossmatched on this sample and 2 units of blood were given. This resulted in a post-transfusion haemoglobin of 15.3 g/dL. The reporter comments that a historical group of AB D positive was subsequently discovered on this patient, but it was not clear if this was from long in the past or from another hospital. It was clear that the wrong patient had been bled as both the haemoglobin and the blood group were incorrect. Fortunately the wrong patient's blood group was O D positive and there was no reaction.

COMMENTARY

Once again these cases highlight the inherent dangers in inadequate patient identification and the possibility of bleeding a wrong patient for both FBC and transfusion samples. Two of these 5 cases involved phlebotomy definitely carried out by a junior doctor, 1 involved a phlebotomist, in 1 the staff group was not given, and in 1 it was too long ago to know. In 2 cases it was pure serendipity that prevented the patient from receiving ABO-incompatible red cell transfusion.

Learning points

- It is essential to have positive patient identification using the patient's wristband to label the sample tube at the bedside, however familiar the patient. Doctors are responsible for a disproportionate number of sample errors (see Near Miss chapter page 160) and must be educated in the critical importance of patient ID for every medical intervention.

Special requirements not met (SRNM) *n* = 117

The total number of cases in this section is 117 compared with last year's total of 93.

The table below (Table 27) shows the breakdown of the different special requirements omitted, and the number of cases of a clinical or laboratory origin. There were no cases in 2008 arising from a blood establishment error or omission.

Table 27
Types of special requirements not met, and proportion of primary clinical and laboratory errors

Type of special requirement	Clinical Cause of Omission	Laboratory Cause of Omission	Total
Irradiation	56	20	76
CMV negative	7	7	14
CMV & irradiation	7	3	10
HLA matched component	1	1	2
Hb S negative required	1	0	1
Paediatric methylene blue treated component	0	5	5
Paediatric apheresis platelets	0	1	1
Phenotyped component	3	4	7
Antigen negative component	1	0	1
TOTAL	**76**	**41**	**117**

This year 45 female and 72 male patients did not have their special requirements met.

Of these a total of 18 were patients under 18 years of age. There were 3 aged 0–28 days, 4 aged 28 days to 1 year, 10 aged 1–16 years, and 1 aged 16–18 years.

Clinical based cases of SRNM *n* = 76

The majority of cases where special requirements were not met related to requests for patients who required irradiated components, but this requirement was not made clear to the laboratory by the clinical staff at the time of requesting the component. A smaller number of cases related to non-communication of a requirement for CMV negative components, or components requiring both specifications. Generally, it appears from the information supplied to SHOT that the doctor ordering the components did not know of the criteria for irradiated or CMV negative products, or was not familiar enough with the patient to realise that this was necessary.

Of the 56 clinical omissions to request irradiated blood, the indications for irradiation were as follows:

- 31 prescription of fludarabine or other purine analogues
- 11 bone marrow transplant or stem cell transplant
- 9 Hodgkin's disease
- 5 indication not given

Of the 7 clinical omissions to give a product both CMV negative and irradiated, the indications were as follows:

- 2 bone marrow transplant or stem cell transplant
- 3 prescription of fludarabine or other purine analogues
- 1 pure red cell aplasia
- 1 indication not given

Other clinical omissions to make a request for special requirements probably also related to lack of transfusion medicine knowledge in non-specialised staff admitting patients through the emergency department.

Case 1

Requestor does not inform blood bank that patient is pregnant

A patient who was 22 weeks pregnant was admitted via the ED with status epilepticus and transferred to ITU. The Hb was 6.7g/dL and 2 units of red cells were requested. No diagnosis was given on the request form despite boxes being available to tick (i.e. pregnant yes/no/unsure). The following day it was discovered by blood bank staff that the patient was pregnant and the units were investigated. One had been, by chance, CMV negative, the other had not.

Case 2

'Sickle cell disease' not stated on request for red cells

A patient was admitted with anaemia and assigned a new hospital number as a new PAS system had recently been installed. No previous transfusion was sought, although this patient had a previous record on another number. The request form stated only 'anaemia' as the indication for transfusion: although the patient suffered from sickle cell disease the diagnosis was not given and therefore laboratory staff were not prompted to check for any previous transfusion history on an old hospital number. The patient was transfused non-phenotyped blood.

In 13 of the 76 cases linked with clinical omission to provide special requirements, the root cause of the problem related to the fact that the patient was undergoing shared care between 2 hospital sites, sometimes within the same trust and sometimes in separate trusts. Information not communicated included:

- irradiated products required due to treatment with purine analogues
- a diagnosis of Hodgkin's disease
- recent mismatched BMT or SCT
- bowel transplant and requirement for irradiated CMV negative components
- requirement for HLA matched platelets

Case 3

SCT centre did not inform referring hospital of ABO mismatched transplant

A patient was referred to another trust for a BMT. Post transplant no details of the donor group were sent to the referring trust, so consequently the blood transfusion department there were unaware that the patient had received a major mismatch marrow (the patient was group O D positive and received a group A D positive transplant) and now required a different group FFP and platelets. The transplant team at the other trust was contacted and they faxed through a copy of the transplant protocol. At the bottom is a distribution list of all those who had received a copy, but this did not include the referring hospital.

COMMENTARY on clinical cases

Doctors not usually working in haematology or oncology may be required to request blood components for these patients despite unfamiliarity with special requirements – a problem that arises from shift working and extensive cross-covering.

Doctors working in non-haematology specialties must be educated sufficiently in transfusion medicine to know that certain patient groups, such as pregnant women and sickle cell patients, have important special requirements for safe transfusion.

Medical staff in the ED and critical care should be reminded of the importance of identifying whether a patient is pregnant. The request form is there to facilitate this, and requires a diagnosis or reason for transfusion, and specifically asks about pregnancy. It should be an absolute requirement, enforced through the Risk Committee and Clinical Governance framework, that transfusion request forms are fully completed. Blood bank staff should be required to ask for these details if they are not given.

Shared care inevitably results in a situation where communication of essential information is required, and there is a risk of communication breakdown. This appears to be the result of a lack of knowledge, especially among clinicians, of the critical transfusion requirements which may arise from the diagnosis and treatment of the shared patient. Detailed

information changes hands, but transfusion details may be omitted, or the transfusion staff may be left out of the communication loop.

Laboratory-based cases of SRNM *n* = 41

The laboratory failed to provide components of the correct specification on 41 occasions. In 5 further instances, although the primary error was clinical, the laboratory could have picked up on the need for the special requirement if staff had been more vigilant. In 2 cases, where phenotyped blood was not issued appropriately, alloantibodies were produced.

The errors in this section mirror those of previous years. In some cases there were no computer flags to prompt laboratory staff but a number of errors occurred when flags were present, and missed, by laboratory staff. It is of note that in a number of cases where errors occurred there was more than one special requirement:

Case 9

Laboratory misses fact that there are 2 special requirements

A patient required CMV negative and irradiated blood components. The request for 2 units of red cells was made. CMV negative but not irradiated units were issued and administered.

Case 10

BMS omits to issue CMV negative components for pregnant woman with sickle cell disease

A patient was pregnant on the high dependency ward and had sickle cell disease. Her Hb was 5g/dL. A request was made for 4 units of red cells urgently. Phenotyped units were requested due to sickle disease but the BMS forgot to order CMV negative units. The patient received all 4 units overnight, the error being discovered when more units were requested the following day to cover the C-section.

COMMENTARY on laboratory cases

Failure to provide irradiated components when required was the biggest group (20/47 cases) in this category. In some cases it is clear that hospitals are relying on a ticked box on the component request form to highlight the need for irradiation. This is easily missed in the laboratory. A more robust mechanism should be in place for informing the laboratory, prior to a request for transfusion, that irradiated components are required for a particular patient. This may or may not involve pharmacy.

There were 5 cases where MB-treated FFP should have been issued to patients under 16 years of age but was not, and 1 case where a child did not receive apheresis platelets. There were no computer warning flags in any of these cases and, although warning flags can be missed, consideration should be given to setting up warning flags based on the date of birth of the patient.

Failure of laboratory staff to select appropriate components when warning flags are present is hard to understand, particularly when the majority of errors are in normal working hours, for routine blood provision and when issued by transfusion specialist BMS staff.

Learning points

- A robust process must be in place for ensuring that the laboratory is aware of the need for irradiation, before transfusion is required.
- Medical staff must have sufficient transfusion knowledge to understand the implications for special requirements of some medical therapies and interventions. This directly affects doctors working in haematology, oncology, paediatrics and obstetrics but must include doctors on call and cross covering.

The following learning point from last year remains pertinent:

- Competency assessment of staff working in the transfusion department must include competencies in the provision of blood components for specific groups of patients and in understanding the importance and use of 'special requirement' flags.

Miscellaneous cases of IBCT *n* = 2

A neonate with hydrops fetalis was massively transfused thereby producing a misleading blood group. Because the child had been registered on 2 separate occasions the 2 records were not matched with each other and therefore the post-transfusion apparent change in group was not recognised.

Case 1

Dual registration results in mis-grouping of massively transfused neonate

A very sick 2-day-old neonate with hydrops fetalis grouped as B D positive and was given large volumes of group O D negative blood in the neonatal period. Subsequently a second sample was taken and details were entered into the neonatal computer system, which interfaced with the hospital computer system. However, the previous medical record number was not retrieved by the computer and a new hospital number was created by the neonatal system. Thus 2 medical record numbers were in use. This second sample grouped as O D positive and the neonate subsequently received group O FFP and platelets. The erroneous group was detected because the patient had been heavily transfused with group O D negative blood prior to the second grouping sample being taken. Because of the 2 hospital numbers, there was no previous record of this in the laboratory. The reporter did not feel that there was a laboratory error involved. The patient was extremely sick and no haemolytic reaction was detected in response to the plasma and platelet transfusions. The patient subsequently died of other complications of hydrops fetalis.

In the second case a hydropic baby was given units incompatible with a maternal antibody, which may or may not have contributed to the baby's condition. The antibody would have been detected antenatally if the hospital had complied with guidelines regarding antenatal screening.

Case 2

A hydropic baby is transfused S positive units, though mother has anti-S, not checked antenatally

A baby girl was born at 37 weeks gestation following emergency CS for reduced foetal movement. The child was pale and floppy and hydropic with petechiae and the Hb was 2g/dL. The baby was group AB D positive, the mother group B D positive and the father group A D positive. Emergency group O negative blood (140 mL) was given. Laboratory tests showed the baby was DAT positive. The mother's plasma contained anti-S titre 1/8 at delivery, and baby and father were both S positive. The anti-S had been undetectable at booking, and the mother was not re-tested at 28 weeks as this was not policy in D positive mothers. There was a poor/absent increment in Hb following transfusion, and the emergency blood was found to be S-positive. An exchange transfusion of S-negative units was prepared and transfused. Samples were sent to NBS, where it was suspected that the immune hydrops was probably caused by an antibody to private antigen from the father, as yet unknown. The mother's anti-S titre was not thought to be high enough to be the primary cause, although it cannot be ruled out.

The laboratory now complies with BCSH guidelines and has persuaded the PCT to fund testing at 28 weeks for all pregnancies, regardless of Rh status.

IBCT events originating in the hospital transfusion laboratory *n* = 132

There are a total of 132 IBCT cases in which the primary error arose in the laboratory, which represents 50% of the total 262 IBCT cases. They have been summarised in Table 19 on page 34 and are discussed in more detail here. Laboratory cases resulting in special requirements not met (41 cases) are discussed above.

In total, laboratory errors account for 200 of the total 1040 cases included in the SHOT report this year. This consists of 132 IBCT events (see Table 28 below), 47 anti-D related events (see page 82) and 21 handling and storage errors (see page 76).

In 2007 there were 121 cases involving laboratory errors consisting of 40 primary laboratory errors, 36 cases of special requirements not met, 20 laboratory-based handling and storage errors, 24 anti-D related laboratory errors and 1 HTR.

The has been a 65% increased in laboratory-related errors. However, the increase in overall reporting to SHOT this year stands at 85%, so the increase in laboratory errors is less than the overall increase. As a percentage of reports included in this 2008 annual report, laboratory errors – at 200 of 1040 cases – represent 19% of the total.

The vast majority of errors are procedural. Mistakes in testing account for only 31 errors (15.5%). Many years of improvements in testing, through participation in the UK NEQAS BTLP scheme, probably account for this. Laboratories now need to concentrate on procedural deficiencies.

Table 28
Summary of laboratory-related errors *n* = 200

Type of error	Number of cases from this chapter
Wrong blood	**39**
Wrong sample selected	4
ABO grouping error	5
D grouping error	11
Incorrect component selected	14
Incorrect labelling	4
Others	1
Wrong group selected for SCT patient	**4**
Wrong ABO group	4
Wrong D group	0
Other pre-transfusion testing errors	**48**
Testing errors	8
Procedural errors	40
Special requirements not met	**41**
Irradiated component	20
CMV negative component	7
CMV negative and irradiated	3
Phenotyped component	4
MB treated FFP	5
IgA deficient cells	0
HLA matched platelets	1
Apheresis platelets not given to a paediatric patient	1
TOTAL	**132**
Anti-D related laboratory errors	**47**
Handling and storage related laboratory errors	**21**
GRAND TOTAL LABORATORY ERRORS	**200**

Wrong blood incidents *n* = 39

This year 'wrong blood' incidents resulted from laboratory errors in 39 cases. This compares to only 15 cases last year.

Three cases involved babies < 4 months old, 1 case involved a 9-month-old baby, 1 case a 2-year-old and in 1 case the age was not given. All other cases were in adults over 18 years of age.

Incidents occurred in an emergency setting in 20/39 cases, while 14 were routine and 5 unknown. Seven of the errors occurred during normal working hours while 29 occurred out of hours, and the time was not given in 3 cases. The staff involved out of hours included 18 BMSs who normally work in transfusion and 11 who do not routinely work in transfusion.

The 39 errors were:

- In 4 cases the wrong sample was tested: 3 for grouping tests and 1 for a crossmatch. The first case resulted in a group A D positive patient being grouped as O D positive and receiving 2 units of group O D positive red cells. In the second case the samples that were transposed were both group A D positive. In the third case 2 samples were transposed resulting in a group O D positive patient being grouped as AB D positive and receiving 2 units of group AB D positive blood and a group AB D positive patient being grouped as O D positive and receiving 3 units of group O D positive blood. Neither patient had adverse reactions and the error was only discovered a year later when 1 of the patients returned to the hospital and had their blood group tested. The error in crossmatching caused no adverse reaction.

- Five ABO grouping errors. One of these errors was an urgent, manual, tile group that was misread. This resulted in a group AB patient receiving 3 units of group A FFP. The second case is difficult to interpret and may not have been an error: a sample from a patient on chemotherapy was grouped as O D positive but the patient insisted they had been grouped as B D positive at another hospital. The laboratory repeated their tests, which showed a group O forward group; however, the reverse group only reacted with group A cells. The patient required blood, and refused to give another sample, so group O D positive units were transfused. A year later the same patient returned and again grouped as O D positive, to be transfused with group O D positive blood. Samples were sent to the local NHSBT reference laboratory, which neither detected B antigen nor showed reaction with group A cells in the reverse group. It is not possible to say whether a weak mixed field reaction was missed or whether the disease state had caused the B antigen to disappear. The other 3 cases were groups performed using automated systems, which then required manual intervention/interpretation. These 3 cases are given below as case studies.

- Eleven errors in D typing. There were 4 female patients > 60 years old and 7 male patients. In 10 cases this resulted in D positive blood being given to D negative individuals and 1 case of O D negative blood being transfused to an O D positive patient. Three of the patients formed anti-D. Ten of the errors were made using manual techniques. Three cases definitely involved transcription errors, with results being correctly recorded on worksheets and then erroneously entered onto the LIMS, while in the other cases the results appear to have been misread. In 1 case the presence of cold agglutinins may have contributed to the error. The final case involves an incorrect interpretation of a weak D result on a sample tested on the Ortho Innova. This is a recognised problem, as highlighted in a number of UK NEQAS exercises and known to the laboratory involved, yet the BMS failed to repeat the D type with further anti-D reagents as per the local SOP (see Case 5 below).

- Fourteen cases of incorrect component selection. Six cases involved red cells. In 1 case this resulted in a neonate having an exchange transfusion with blood outside the specification of blood for neonatal exchange. A second case also involved inappropriate selection of blood for a neonate: the group A premature baby of a group O mother with anti-Fya was transfused group A blood that had not been tested for Fya and was issued using electronic issue. Other cases involved Group O blood being given to an AB patient, O D positive blood to an A D negative patient, O D positive to an O D negative patient, and an O D positive Octapack to an AB D negative baby. Four cases involved cryoprecipitate. In 3 cases cryoprecipitate was issued when FFP

was requested and in 1 case 10 pools of cryo were issued and transfused when 10 single units or 2 pools had been required. In 2 cases platelets for specific patients were transposed. Two cases involved FFP; in 1 case group O FFP was given to a group A patient and in 1 case cryodepleted FFP was issued when FFP was required.

- Four cases occurred in which units were labelled incorrectly by the laboratory, 1 case involving red cells and 3 cases involving platelets. The bedside check failed to identify the previous error.

- In 1 case a phone call was received to crossmatch blood for patient X and send it to an off site location. The full details of the patient were not noted and unfortunately a patient with a similar name (different hospital number and date of birth) was being tested at the same time. Blood was sent over labelled for patient Y but transfused to patient X. The error was noted when the second unit was checked at the bedside pre transfusion. Fortuitously, the 2 patients had the same blood group and a negative antibody screen.

Case 1

Historical error elucidated from full electronic laboratory records and automation

On authorising a blood group on patient X, the pathology computer flagged a mismatch with historical data, which gave the blood group as AB D positive. The blood group from the sample was interpreted as O D positive. The sample labelling was correct and the blood group was re-analysed and found to be O D positive. The doctor agreed to take a further blood sample, which was also found to be O D positive. The historical search identified that 2 units of AB D Positive red cells were transfused a year earlier with no adverse effects. Having identified when the sample was tested, the archive record on the automation was interrogated and it was found that the sample had been analysed with 1 other sample, which grouped as O D positive; the patient had been crossmatched and 3 units of red cells transfused. The patient had received antenatal care from another hospital and was grouped as AB D positive at booking and at 28 weeks' gestation. The conclusion of this investigation was that the 2 blood samples had been transposed and an O D positive patient had received 2 units of AB D positive red cells in 2007 with no adverse effects. The second patient, whose correct blood group was AB D positive, received 3 units of O D positive red cells in 2007 with no reaction.

Case 2

When IT fails electronic issue cannot be used

A 19-year-old female was admitted as an emergency with head trauma. The sample was tested using routine automation but the interface stalled and the result was entered manually onto the LIMS. Results from the wrong patient were entered. The blood was then issued using electronic issue. Four units of A D positive blood were transfused to this O D positive patient. The error was identified when the patient developed symptoms of a HTR with red urine and falling haemoglobin. Fortunately the patient made a full recovery from her ABO-incompatible transfusion.

Case 3

Competency assessment on blood group anomalies must form part of training

A grouping discrepancy was highlighted on the automated group of a 74-year-old patient requiring transfusion for anaemia. The forward group was A, but there was no reaction with the B cells on the reverse group. The BMS rechecked the group and thought that there was a weak reaction with the anti-B and interpreted the group as AB. However, as there was uncertainty, the BMS selected group A red cells for transfusion. Further testing of the sample by laboratory staff, the following day, confirmed that the group was A. It was felt that inexperience led to the mistake.

Case 4

The difficulties encountered with cases of AIHA

A 93-year-old female with AIHA was transfused 4 units of group A D positive blood, rather than group O D positive blood, because of a laboratory error in result interpretation. The patient sample was tested routinely overnight but the group results were not transmitted because they required interpretation. The antibody screen results were 3+ and the DAT 4+. Next morning the card was manually interpreted, incorrectly, as group A D positive and the result entered onto the LIMS. Further samples were sent to NBS RCI for investigation but a crossmatch was not requested. RCI phoned to say that the patient had autoantibodies and anti-E and suggested selecting E negative, K negative blood for crossmatching. Later the need for blood became urgent and a 4-unit crossmatch was set up, selecting A D positive, E negative, K negative blood. The crossmatch was incompatible as was the auto. The blood was issued with a warning that the blood was incompatible and that the patient should be closely monitored. The error was noticed when the

RCI report arrived in the post. The patient transfusion administration chart stated 'nil adverse event'. Over the next few days her Hb gradually fell but she had no effects that could not be attributed to her underlying condition. It was concluded that the drug regime used to suppress the AIHA had afforded protection against the incompatible units.

Case 5

D types must not be assigned on one weak reaction

A patient initially gave a weak reaction with anti-D and was reported as D positive without further investigation. Two units of D positive red cells were transfused and all subsequent samples grouped strongly as O D positive with no mixed field. Fourteen group O D positive red cells and 6 group O D positive platelets were transfused over a 3 week period. Several months later the patient presented as group O D negative with anti-D. Genotyping at IBGRL confirmed the patient as D negative.

Case 6

Take due care when selecting blood for special patient groups

Two units of blood were ordered from NHSBT, 1 unit for a neonatal exchange transfusion and the other a genotyped unit for a child with thalassaemia major. The duty BMS issued the irradiated unit, specified for exchange transfusion, to the thalassaemia major patient and the non-irradiated, genotyped unit for the exchange transfusion. The error was detected when the paediatrician realised they did not have sufficient blood to complete the exchange transfusion. The child with thalassaemia major did not receive any blood as the mistake had been identified prior to commencement of her transfusion.

Case 7

Take due care when selecting platelets for special cases

NHSBT delivered 2 units of platelets for 2 different patients. The BMS transposed the units and issued the pack of HLA matched platelets, specifically ordered for a haematology patient, to the other patient, who was bleeding. The platelets were ABO compatible.

Case 8

Is causing less distress to a paediatric patient a valid reason for using less safe practice?

While a 9-month-old male patient was in the anaesthetic room under anaesthesia, blood was taken for a group & save test. This is the usual procedure for children to avoid distressing younger children prior to (elective) surgery. To check the blood group type, a manual group & save was performed. The BMS authorised the blood group and antibody screen as group O D positive, antibody screen negative, and 2 units of O D positive units were issued and transfused. This was a misreading by the BMS. The patient was actually group O D negative when a repeat sample was tested later using automation. No anti-D had been formed at the time of the report.

COMMENTARY on wrong blood incidents

The number of laboratory errors contributing to 'wrong blood' events has increased this year from 15 to 39. This is a significant increase and mirrors the increase in reporting in all categories. The increased errors are largely in D typing and component selection.

The number of ABO errors have remained relatively constant for the last 3 years (see Table 29 below). This year the errors have resulted in 4 ABO-incompatible transfusions: 2 units of AB blood being transfused to a group O patient, 2 cases of 4 units of group A blood being transfused to group O patients and 1 case of group A FFP being transfused to a group AB patient.

Fourteen cases of D-incompatible transfusion due to laboratory errors are reported this year, with anti-D known to have been produced in 3 cases at the time of writing. Fortunately all 3 of these patients were women over 60 years of age.

Table 29
Trends in laboratory based ABO grouping errors, with causes

Year	Total No. of Cases of ABO Errors	Wrong Sample Tested	Interpretation /Transcription Errors	Other	ABO-incompatible Transfusions (all components)	Sequelae
2003	17	8	9		7	2 major morbidity
2004	18	5	12	1	6	1 death 1 major morbidity
2005	22	9	12	1	9	1 AHTR
2006	6	2	3	1	0	No morbidity
2007	7	3	4		2	No morbidity
2008	8	3	5		4	1 AHTR

As reported in previous years the majority of errors occur out of hours. However, this year, the number is huge, 29/39 cases or 74%. Another data gathering exercise is required to determine current workload data to see whether this increased error rate is a reflection of an increase in workload outside routine hours or an increase in the error rate, or both. This year the majority of errors made out of hours were made by BMS staff who work regularly in transfusion (18/29 cases or 62%). Half of the errors made were in blood component provision for emergency cases.

All but one of the ABO and D typing errors occurred because of mistakes in manual procedures. The fact that errors occur most often during manual procedures has been documented in consecutive SHOT reports. Despite this evidence that manual procedures are inherently less safe than automated ones, patients for elective surgery are still being tested, at the last minute, by manual methods and this requires review.

The increase in component selection errors is interesting, particularly in regard to the number of errors in the selection of cryoprecipitate, as it parallels the introduction of the new component, pooled cryoprecipitate, by the NHSBT in October 2006. It should be possible to set up warnings in the LIMS to highlight when the component issued for a patient does not match that of the component ordered. This facility does not appear to be widely used/available. There were a number of component selection errors that resulted from carelessness at the point of issue, often when specific components had been ordered from NHSBT, arriving ad hoc; see Case 4 and Case 5 above, and further examples in the 'Other pre-transfusion testing errors' section.

In 9 cases it was believed that the final bedside check could have picked up these laboratory errors and prevented mis-transfusion.

Learning points

- Electronic issue must only be used on the first presentation of a patient if the results of that sample have been tested using full automation with an interface to the LIMS and there have been NO manual interventions.
- Before staff are deemed competent to work alone they must be aware of, and competency assessed to deal with, blood grouping anomalies.
- Blood grouping can be problematic in the presence of cold agglutinins. Laboratories need to review procedures and staff training to ensure presence of clear instructions and competence in dealing with this problem, including when to send samples away to a reference laboratory.
- When new components are introduced, training must be given to all staff to allow thorough familiarisation with the component appearance, label and specification.
- BMSs must take care when issuing components to patients with specific requirements.
- NHSBT should review the packaging of components that look similar, to assess whether they could be more easily identified, particularly when those components are often used in emergency situations.
- The IT system should be configured to flag a component discrepancy between that ordered and that issued, and this should be fully validated. If this is not possible locally these development requirements must be raised with LIMS suppliers.
- Telephone requests for blood components must follow the strict rules that are in place for written requests, i.e. the patient's full name, hospital number and date of birth must be obtained.

The following learning points from previous reports remain pertinent:

- Manual processes are more prone to error. During process validation ensure that manual procedures and interventions are kept to a minimum and that appropriate checks are in place at weak, manual points of a process.
- Training and competency assessment in the laboratory must cover basic manual checking procedures to ensure that these are second nature at a time when automation and computerisation will have lessened experience and practice in these basic skills.

Wrong ABO or D type blood components issued for SCT/BMT recipients *n* = 4

All cases were in adults. Three were routine transfusions and 1 was an emergency. Two cases occurred during normal working hours, 1 during a shift and the timing was not known in the fourth case.

In the first case group A blood was given to a group A recipient of a group O transplant, 1 month post transplant. The transplant information was not passed on to the laboratory but the request form contained the clinical detail 'post allo BMT' and the reporter thought the laboratory should have made further enquiries. There was no adverse reaction from the transfusion.

In the second case the BMS failed to add pertinent transplant blood group information to the LIMS. The historical group was A D positive but group O D positive units were required post transplant. Ten units of group A D positive blood were transfused over a 5-month period. No adverse reactions occurred.

In the third case the donor of a peripheral blood stem cell transplant was group A D positive and the recipient group O D positive. The patient should have been given group A D positive platelets but received group O D positive platelets on 4 occasions. No adverse reactions occurred.

In the final case the donor of a bone marrow transplant was group O D negative and the recipient group A D positive. A granulocyte transfusion was required and 3 units of group A D positive granulocytes were issued when group O D negative should have been selected. Although donor and recipient blood group details were on the LIMS, unfamiliarity with the use of granulocytes meant that the significance of the blood group was not realised.

Learning points

- Simple yet robust procedures must be in place for recording transplant details.
- Selection of blood and blood components post transplant must be included in competency assessments.

Pre-transfusion testing errors *n* = 48

The number of errors in this category has more than doubled from 20 cases last year. Two of the cases involved babies under 4 months of age' there were 2 cases in children under 16 years, and 2 further cases in patients under 18. In 1 case the age was not stated and the rest occurred in adults.

Twenty-one cases occurred during normal working hours, 24 cases out of hours, and the time was not stated in 3 cases. Of the 24 errors made out of hours, 14 were made by BMSs who normally work in transfusion, 9 by BMSs who do not and in 1 case the status of the BMS was not known.

The 48 errors can arbitrarily be split into:

- Testing errors, i.e. the correct tests were performed but incorrect results obtained, either by poor performance of the test, transcription error or incorrect interpretation
- Procedural errors, e.g. incorrect test selection, failure to follow procedure

Testing errors n = 8

Seven of the errors resulted in weak antibodies being missed, with no adverse events following these errors. The eighth error involved the use of the wrong sample for a crossmatch on a patient with AIHA and multiple antibodies. This patient suffered an acute transfusion reaction that resolved with no complications.

Two interpretation errors occurred: in 1 case an initial interpretation of non-specific antibody was later interpreted as an anti-Fyb by more experienced staff (an NBS reference centre error) and in the second case an anti-Jka was excluded on the basis of a positive Jka type when in fact the sample typed was a post-transfusion sample.

It is debatable whether 3 of the cases in this section were errors or just very weak antibodies, at the limit of detection, that reacted more strongly with one technique than another.

Procedural errors n = 40

In 34 of these cases the patient suffered no reaction. Of the remaining cases:

- 1 outcome was not stated
- 1 died from underlying condition
- 1 involved a possible transfusion reaction but was not thought to be related to the error
- 1 involved a mild reaction
- 1 patient with AIHA produced anti-E (and it is difficult to say whether there was a reaction because of the AIHA)
- 1 case involved the production of anti-K in a 17-year-old female

There were many different types of procedural error:

Testing unsuitable samples n = 9

There were 8 cases where the sample used was too old (ranging from a few hours out of usable time to 27 days out of date) and 1 case where the sample was tested despite a discrepant date of birth between sample and request.

Case 9

IT warning flags are only helpful prompts. Staff must understand the reasons behind protocols.

The patient had been transfused on 28/01. The sample was therefore unsuitable to use from 30/01 according to local policy. Despite this the sample was used to serologically crossmatch blood on 03/02, the computer indicating that electronic issue was unavailable. The 2 members of staff involved in the incident were senior members of the haematology department working in blood transfusion 'out of hours'. It was clear that they did not understand the reason for the computer indicating that electronic issue was unavailable. The blood was transfused uneventfully.

Failure to find historic records n = 4

In 1 case the use of an ED number meant that a record under the hospital number, with anti-E, was not found. There was 1 case where a name search was performed incorrectly and a record with anti-E was not found. In a third case the staff forgot to search the old database, missing a record with anti-e+K. In a final case there were 2 hospital numbers on file, merging of records did not take place, and so the record with anti-Fy^a on file was missed.

Failure to provide correctly phenotyped units n = 12

- 2 cases where clerical error, when ordering specific phenotyped units from NHSBT, meant that blood of an inappropriate phenotype was received and then crossmatched: units that were Jkb negative rather than Fyb negative and units that were not S typed when they should have been. The crossmatches were compatible as the antibodies were historic and not detected in the current sample.
- 2 cases where antibody information, given over the phone from reference laboratories, was misheard: anti-S misheard as anti-f, and anti-C misheard as anti-E.
- Not issuing phenotyped units to a patient with AIHA resulted in an Ro patient being given E positive blood, which produced anti-E.
- Crossmatching E-c- for a patient with sickle cell disease who required e-C- phenotype due to historic antibodies.
- Failure to provide K negative units for a patient with historic anti-K.
- Failure to provide K negative units to a pre-menopausal female who produced anti-K.
- Failure to select Fy^a/C^w negative units for a patient with historic anti-Fy^a and anti-C^w.
- Failure to receive appropriately phenotyped units due to a clerical error, regarding a historic antibody specificity, on the request form to a referral laboratory.
- The BMS did not realise that antigen negative blood had to be obtained for historic antibodies (anti-f plus anti-Jk^a). As the current antibody screen was negative, crossmatch compatible blood was issued.
- Failure to understand the importance of historic maternal antibodies when selecting blood for a neonate. The mother had anti-c+E (though this was not detected on the current sample), but group O D negative blood was issued to the baby without a crossmatch.

Case 10

The importance of antibody history

Patient arrived in the ED with a GI bleed. Two units of flying squad group O D negative blood were used. A group antibody screen and retrospective crossmatch on the group O D negative units was performed. The antibody screen was negative but the BMS on call noticed that the patient had previously had anti-Jka and anti-f. About 12 hours later the ward phoned asking for more blood to be crossmatched. The current antibody screen was negative and the BMS did not realise that antigen negative blood should have been selected. All units were crossmatch compatible. The patient received 3 units of group A D positive blood. The following day the incident was discovered by routine day staff and all units were Jka typed. All were Jka positive (including the flying squad blood) and 2 of the group A D positive units were also positive for f. The patient died from the underlying condition.

Cases in which blood was issued despite incomplete pre-transfusion testing n = 12

- 2 cases where the group & screen was not complete.
- 4 cases where antibody identification was not complete.
- 1 case where antibody identification was not performed.
- 1 case where the crossmatch was incomplete but the blood was labelled.
- 1 case where blood arrived from NHSBT and the BMS thought it had been crossmatched and issued it without crossmatching.
- Failure to update critical notes following antibody identification that had an impact on the subsequent presentation of the patient.
- BMS went straight to a warm NISS antibody screen and crossmatch because of a historic cold agglutinin. The antibody screen was negative and the crossmatch was compatible and 4 units of blood were issued. The patient suffered a mild transfusion reaction of pyrexia, nausea and rigor, so a transfusion reaction investigation took place. Routine screening and crossmatch methods were employed. The cold agglutinin was no longer detectable but a weak alloantibody was detected.
- Blood issued via electronic issue (EI) before DAT complete.

Case 11

The need for complete documentation

Six units of blood were issued using emergency procedures for a patient admitted with a GI bleed. Full compatibility testing was completed retrospectively. An antibody was detected in the screen and 1 unit out of the 6 issued was incompatible. The BMS immediately contacted the clinical area to recall the units; however, 4 units, including the incompatible unit, had already been transfused. On investigation, laboratory testing of the patient's previous sample had detected and identified anti-C+D+E. However, the patient's critical notes had not been updated. This resulted in the BMS being unaware of the requirement to provide antigen negative blood during the emergency. There was no adverse reaction reported.

Errors during crossmatching n = 3

- 1 case where an immediate spin crossmatch was used when an IAT crossmatch should have been used.
- 1 case where the BMS continued to issue blood by EI following a transfusion reaction, with no investigation into the reaction.
- 1 case where a neonatal sample was used for the crossmatch when the maternal sample should have been used.

Cases that are reported in other sections of this chapter, because that is where the primary error occurred, had secondary errors of inappropriate use of electronic issue (EI).

- Two cases from 'Wrong blood' incidents:
  - EI on a baby when the mother had anti-Fya and possible maternal IgG anti-A.
  - EI of blood on first presentation of patient, following a manual intervention on recording the grouping result.
- The cases reported above, under incomplete pre-transfusion testing:
  - EI performed when the antibody screen was positive, but the identification was outstanding.
  - EI performed when DAT outstanding.

COMMENTARY on pre-transfusion testing

The increase in the number of errors from 20 last year to 48 this year is at least in part accounted for by the overall increase in reporting in 2008 in all categories, which reflects increased awareness of what to report and greater participation in the SHOT scheme. In addition, as laboratories improve their quality systems in line with the Blood Safety and Quality Regulations 2005[1] and the new CPA Standards (www.cpa-uk.co.uk) there may be better recognition of procedural failures.

The percentage of errors occurring out of hours still appears to be higher than within core hours but this is not as marked as in the cases of 'Wrong Blood' errors.

Learning points

- Errors are still being made in using inappropriate samples. Computer warning flags are a useful tool but must be backed up with strong theoretical knowledge.
- In both the 'wrong blood incidents' section and this section, careless errors seem to have been made in issuing specially selected components sent from NHSBT. Care must be taken when issuing specialist components.
- Competency assessment must comprehensively cover the areas of phenotype selection, antibody history and appropriate use of EI.

Brought forward from last year:

- Laboratories must ensure that robust systems are in place for highlighting 'outstanding' work on a patient.
- Transfusion laboratories must have thorough search strategies when looking for patient histories in order to find and reconcile multiple entries for a patient.

RECOMMENDATIONS for IBCT chapter

New recommendations for 2008

- Competency assessment of staff involved in the transfusion process must be relevant to the person's core role and knowledge requirements. This must be carried out in accordance with NPSA SPN 14.

  Action: Clinical risk managers, HTTs

- All staff must be trained (and competency assessed) in recognising the different blood components and their labels.

  Action: Clinical risk managers, HTTs

- The potential risks of access to emergency O D neg units within satellite fridges should be recognised and strategies put in place to minimise lack of correct identification. Clear guidance should be formulated regarding their use and potential risks associated with their removal from fridges. The emergency units should be separated and clearly labelled.

  Action: Clinical risk managers, HTTs

- Shared care discharge notification, giving tick-box options for special requirements, with reasons, should be completed by the referring clinicians and forwarded to the receiving hospital through the laboratory network.

  Action: NBTC, RTCs

- Laboratory procedures should be validated in line with the BSQR and should be revisited following an error as part of Corrective and Preventive Actions.

  Action: Transfusion laboratory managers

- Competency assessment in laboratories must be linked to process. BMS staff must be competent in performing the test but must also have a thorough understanding of the context in which the test is being performed, i.e. the test in relation to a specific patient and the clinical information. Basing competency assessment on National Occupational Standards (NOSs) will enable this, as NOSs have both 'Performance' criteria and 'Knowledge and Understanding' criteria.

  Action: Transfusion laboratory managers

- The UK Transfusion Laboratory Collaborative has recommended minimum standards for hospital transfusion laboratories in terms of staffing, technology, training and competence. This document is in press in *Transfusion Medicine*[2] and should form the basis for future laboratory planning.

  Action: CEOs, Pathology managers

Recommendations from previous years

Year first made	Recommendation	Target	Progress
2007	Education of doctors and nurses involved in transfusion must continue beyond basic competency to a level where the rationale behind protocols and practices is understood. Transfusion medicine needs to be a core part of the curriculum.	**NBTC, Royal Colleges, GMC**	Royal Colleges and Specialist Societies Committee working with NBTC.
2007	Staff involved in blood component transfusion must be aware of their professional accountability and responsibility.	**GMC, NMC, IBMS, professional insurance schemes**	
2001	Existing procedures should be re-examined for flaws that could lead to systems errors.		BCSH Guidelines on Blood Administration, currently under review.
2002	Resources must be made available in Trusts to ensure that appropriate and effective remedial action is taken following transfusion errors.	**HAs, PCTs, Trust CEOs through HTCs and risk management structures**	No mechanisms for monitoring.