11. INCORRECT BLOOD COMPONENT TRANSFUSED

Definition
This section describes all reported episodes where a patient was transfused with a blood component or plasma product which did not meet the appropriate requirements or which was intended for another patient.

As in all four previous years this category represents the highest number of reports (213 or 68.9% of 309 new non-infectious reports and 67.6% of all new reports). This represents an increase of 6% over the previous year. This chapter analyses 179 new questionnaires and one explanatory letter plus 10 questionnaires brought forward from last year. Completed questionnaires are still outstanding on 33 new initial reports and will be analysed next year.

Analysis of reported errors

The questionnaires sought further information about the circumstances and factors which may have contributed to errors and adverse outcomes. The findings are presented in some detail with the use of case studies where appropriate. The aim is to illustrate weak points in the transfusion process in order to help those responsible for training staff, or for the review and implementation of transfusion procedures, to identify areas for improvement and so ensure that the right blood is given to the right patient at the right time.

The data from 190 completed questionnaires are presented.

The following 3 tables give information on the gender and age of recipients and the blood components implicated in the incidents.

Table 13
Gender of IBCT patients

Female	=	102
Male	=	87
Unknown	=	1
Total	=	**190**

Table 14
Age of IBCT patients

Age of recipients	
Age range	0 days to 94 years
Median Age	56 years

Table 15
Components implicated in IBCT (200 components in 190 cases)

Components implicated	***Number of cases***
Red cells	139
Platelets	31
Fresh Frozen Plasma	9
Anti D immunoglobulin[1]	17
Albumin[2]	4

[1] Adverse events to this plasma product are usually reported through the MCA yellow card system but they are reported here because they fall into the category of either blood derivative to the wrong patient or unnecessary infusion of a blood derivative due to an error earlier in the chain.

[2] Two cases of administration of “expired” albumin, 1 case of albumin being requested for and administered to the wrong patient, and 1 case of 4.5% albumin issued in error instead of 20%. As with anti D, adverse events to albumin would normally be reported through the MCA system.

The outcome of 190 fully analysed incidents is shown in Table 16.

Table 16
Outcome of 190 fully analysed incidents

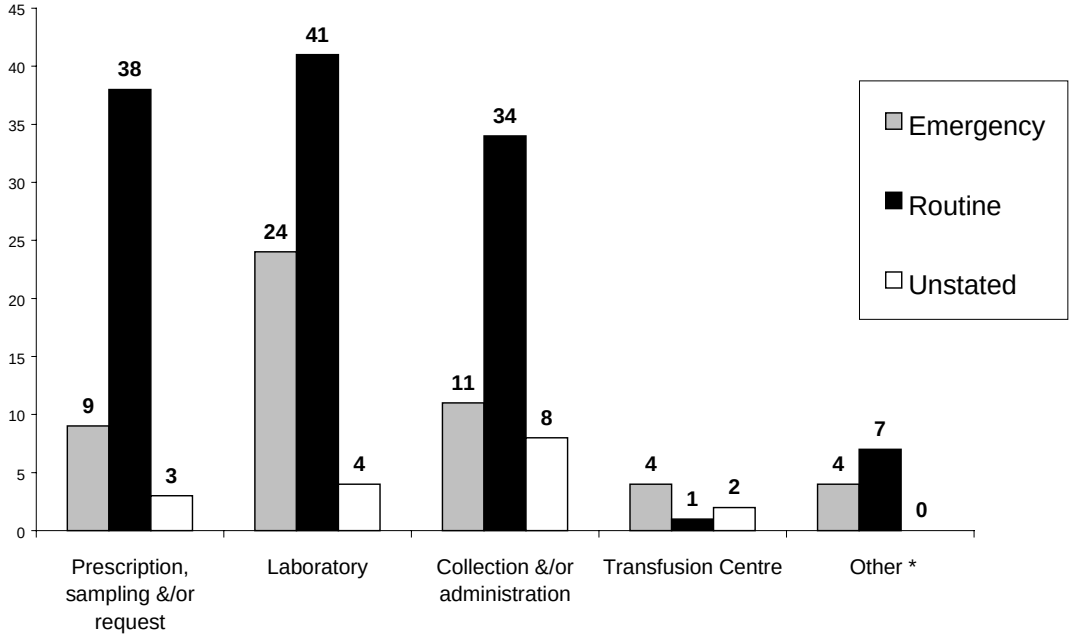
OUTCOME	NO. OF INCIDENTS
Death possibly related to transfusion	3
Death unrelated to transfusion	19
Major morbidity*	6
Minor or no morbidity	160
Outcome unstated by reporter	2

* Major morbidity was classified as the presence of one or more of the following:
- Intensive care admission and/or ventilation
- Dialysis and/or renal impairment
- Major haemorrhage from transfusion-induced coagulopathy
- Intravascular haemolysis
- Potential risk of RhD sensitisation in a female of child-bearing potential

Emergency and elective transfusions

Of the 190 completed questionnaires, 121 related to elective and 52 to emergency transfusions. Seventeen questionnaires did not state whether the transfusion was elective or emergency. Figure 16 shows the distribution of errors relating to emergency and elective transfusions.

Figure 16
Incidence of errors at the various stages of the process of emergency and elective transfusion (n=190)



***** Other = 2 cases of expired albumin where it was not possible to determine who was responsible for maintaining stocks; 1 case of a communication failure between the hospital transfusion laboratory and the ward; 1 case of a patient who had duplicate hospital records but with completely different dates of birth; 4 cases where it was not possible to determine the source of the error; 3 cases of erroneous Hb results leading to unnecessary transfusions but for which the reason for the invalid result was not known.

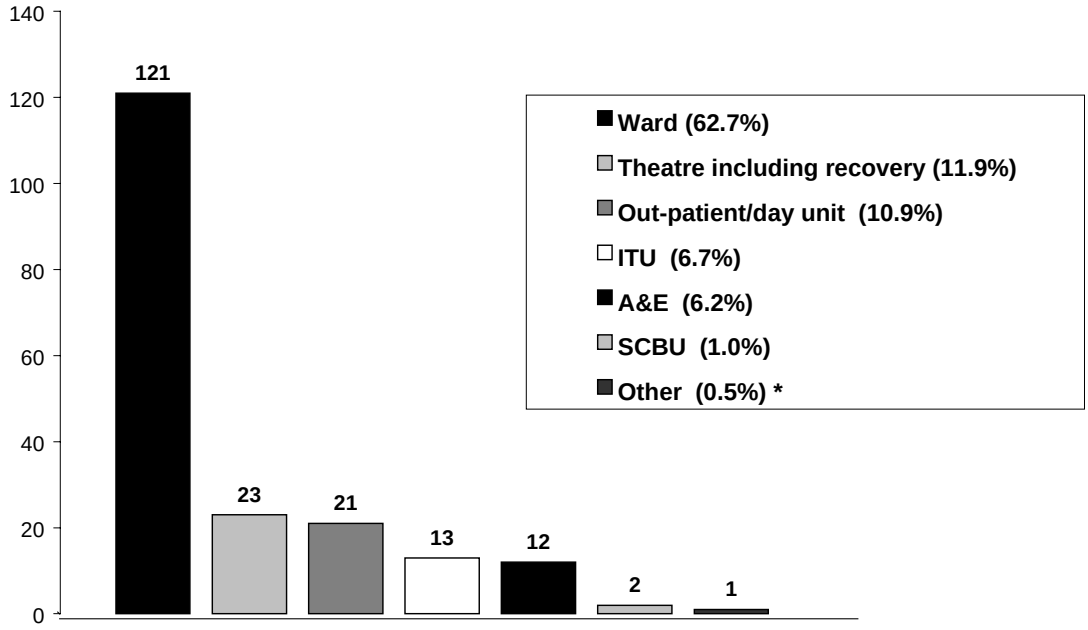
This year, as well as asking whether the error occurred in an emergency or a routine situation, we asked whether the error occurred in or out of normal working hours. There has been some confusion over what was actually meant by "in and out of normal working hours" which we will endeavour to clarify in next year's questionnaire. However the figures are interesting, although of limited value due to the lack of denominator data.

- 88 transfusions took place in normal working hours (46.3%).
- 77 were outside normal working hours (40.5%).
- 6 reporters said that transfusions had taken place both inside and outside normal working hours (3.2%). All these cases involved multiple units.
- 2 reporters stated that they did not know the answer to this question (1.1%).
- 17 reporters did not respond (8.9%).

Site of transfusion

The questionnaire asked for information about where the transfusion took place. One hundred and eighty seven reports gave information on the site of the transfusion (Figure 17). This information is of limited value, however, as no denominator data are available.

Figure 17
Site of transfusion (n=193) #

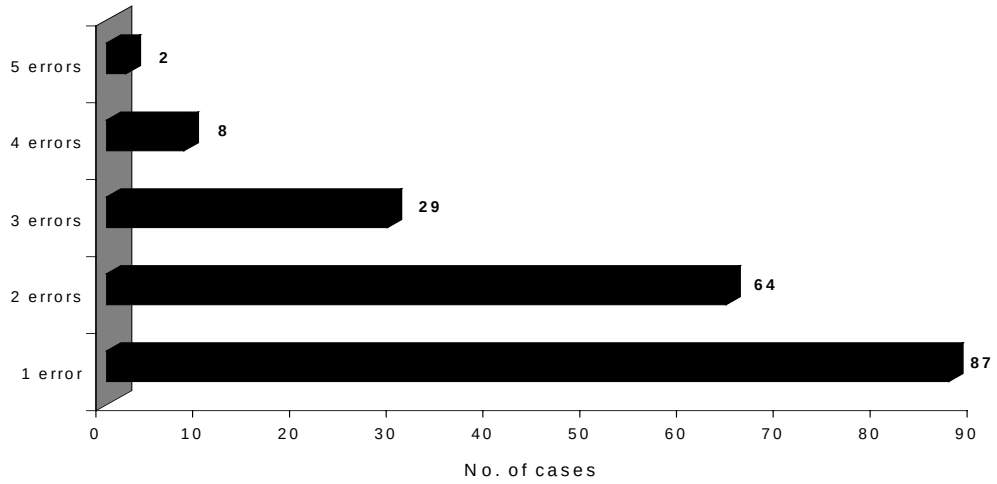


* 1 x during transport to another hospital
\# 6 cases involved transfusions on 2 separate sites

Multiple errors continue to contribute to many "wrong blood" transfusions

In all 4 previous years it has been consistently noted that multiple errors have been implicated in many "wrong blood" incidents and in the 5th reporting year these remain significant. Analysis of 190 completed questionnaires has highlighted 103 cases (54.2%) where multiple errors in the transfusion chain culminated in a "wrong blood" transfusion. This year a total of 344 errors was noted in 190 cases and further detail is shown in Figure 18.

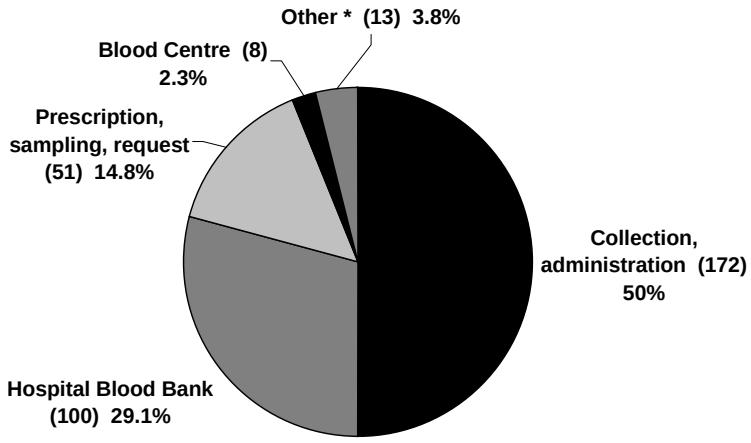
Figure 18
Total number of errors per case (total cases = 190; total errors = 344)



Distribution of errors

The following pie chart (Figure 19) shows the distribution, according to the main reporting categories, of a total of 344 errors from the analysis of 190 completed reports. A more detailed analysis of the distribution of total errors can be seen in Table 17

Figure 19
Distribution of total errors according to the main reporting categories (n=344)



***** **Other** = 2 cases of expired albumin where it was not possible to determine who was responsible for maintaining stocks; 2 cases of a communication failure between the hospital transfusion laboratory and the ward; 1 case of a patient who had duplicate hospital records but with completely different dates of birth; 1 case where it is thought that the patient's Hb result was written wrongly in the notes; 4 cases where it was not possible to determine the source of the error, and 3 cases of erroneous Hb results leading to unnecessary transfusions but for which the reason for the invalid result was not known.

Table 17
Distribution of procedural failures in terms of total errors (n=344)

Each year data emerge which are instructive but which do not fit into pre-existing coding categories. We endeavour to discuss these cases in the text and to take account of the need for new coding categories in subsequent reports. A number of such cases appear in the footnotes to this table, most notably "communication errors" which are discussed separately later in the chapter.

	Number of errors
Prescription, sampling and request	
Sample taken from wrong patient	3
Details on request form incorrect	6
Details on sample incorrect	3
Prescription of inappropriate and/or incompatible component(s)	2
Inappropriate Request	33
Other[1]	2
Unknown[2]	2
Total	**51**
Hospital Blood Bank	
Transcription error	6
Failure to consult/heed historical record	11
Grouping error	10
Missed antibody(ies): Screen error	4
Missed antibody(ies) Identification error	3
Selection/issue of inappropriate component	20
Labelling error	5
Failure to irradiate	7
Crossmatch error	4
Crossmatch wrong sample	3
Incorrect serological reasoning	6
Clerical error	2
Technical Error	5
Failure to clear satellite refrigerator	7
Failure to detect error by Blood Centre	2
Other[3]	3
Unknown[4]	2
Total	**100**
Collection and Administration	
Collection of wrong component	29
Failure to detect error earlier in the chain	38
Failure of bedside checking procedure	82
Wristband missing or incorrect	11
Inappropriate component selected by clinician	7
General administration error	4
Other[5]	1
Total	**172**
Supplying blood centre	
Incorrect group	1
Inappropriate component supplied	4
Other[6]	3
Total	**8**
Other	
Expired albumin given. Not possible to determine who was responsible for maintaining stocks	2
Communication failure between the hospital transfusion laboratory and the ward	2
Patient who had duplicate hospital records but with completely different dates of birth	1
Haemoglobin result probably written wrongly in the notes.	1
Not possible to determine the source of the error	4
Erroneous Hb results leading to unnecessary transfusions but for which the reason for the invalid result was not known.	3
Total	**13**
Total	**344**

[1] 2 x Communication errors
[2] 1 x Possibly pre-transfusion sample diluted with saline; 1 x Sample may have been taken from drip arm;
[3] 1 x Failure to maintain proper stock levels; 1 x Failure to input into computer telephoned special requirements; 1 x Failure to tell Blood Centre of special requirements
[4] 1 x Unable to determine the source of the error within the laboratory; 1 x Possible wrong haemoglobin result given out
[5] 1 x Wrong slip taken to blood bank but unable to determine responsible person
[6] 2 x Transport error; 1 x Did not follow Red Book guidelines in production of component

The pitfalls of a complex, multi-step, multidisciplinary process.

The following analysis of 344 errors occurring in 190 cases illustrates how events combine to result in a 'wrong blood' incident.

Errors in prescription, requesting of blood components and patient sampling

There were 51 errors in this category occurring in 50 case reports.

Sample errors (6)

This year 3 samples were taken from the wrong patient. In 2 cases the sample tubes were handwritten, in one case by a doctor and in the other case by a nurse. The first case resulted in a group O RhD positive patient being grouped as A RhD positive and receiving 8 units of blood, 4 units of FFP and a pool of platelets. The patient survived the complications of intravascular haemolysis. The second case resulted in a group A RhD positive patient being grouped as O RhD positive but there were no adverse sequelae. In the third case the tube was handwritten but prelabelled by a nurse. This resulted in an ABO incompatible transfusion which led to renal failure.
In another case a doctor took a sample when the patient did not have a wristband and put an incorrect hospital number on the sample tube. This led to the laboratory not finding important historical records on that patient.

Case Study 1

Three wrongs make a right

Two patients on the same ward had the same name but different dates of birth and different hospital numbers. A decision was made to transfuse patient A. The sample was labelled with Patient B's details (error 1). As patient B had no historical transfusion record no error could be detected by the hospital Blood Bank and the sample was grouped as O RhD negative. The blood was crossmatched and issued. The nurse collecting the blood for patient A failed to notice the discrepancy in the identification details on the compatibility report (error 2) and when the blood was checked before administration the wrong patient details were also missed (error 3). Serendipitously the right blood was transfused to the right patient.

Errors in Hb estimation (9)

For the first time last year errors in Hb estimation were reported as a cause of unnecessary blood transfusion. This year a further 9 reports were received in this category. These cases have been grouped together as they all led to mis-prescribing of blood but they comprise a number of different errors and therefore do not fall into a single SHOT reporting category:
In two of the cases the patients died possibly as a result of the transfusion. In the first of these the patient was admitted with ischaemic heart disease, an apparent Hb of 80 g/L and symptoms which were at the time attributed to anaemia. The Hb result was released by the laboratory without being validated. Two units of red cells were subsequently transfused resulting in a post transfusion Hb of 140 g/L. The patient developed renal failure and died. It was unclear why the initial Hb result was incorrect although one possibility identified by the reporter was that the original sample was low volume. The second case involved a patient admitted in an emergency with haematemesis. She was given saline and a blood sample taken. Although the patient had no further bleeding following admission the Hb result was given as 72 g/L. Following transfusion of 3 units of red cells her Hb result was 160 g/L. Again it is unclear why the first Hb result was incorrect although it is believed that the sample may have been diluted with saline. This patient suffered fatal cardiac problems post transfusion which may have been a consequence of over–transfusion.

In one case the laboratory result was incorrect and in another case the laboratory phoned the wrong result. In another case the patient was transfused 4 units based on a Hb result obtained, during surgery, from a blood gas analyser. The result obtained was 60 g/L but post transfusion the Hb result was 170 g/L. In one case it was thought that the sample used for testing pretransfusion was probably diluted with saline from a drip arm, the pre-transfusion Hb being 54 g/L whilst the Hb result post a 4 unit transfusion was 182 g/L (see case study 2 below). In a further 3 cases it could not be ascertained whether there had been sampling or laboratory technical errors.
The BCSH Guidelines for the clinical use of red cell transfusions[6] state that the risks of transfusion need to be balanced against the perceived benefits. Consideration of the patients' clinical condition is an essential part of the decision to transfuse red cells or not and is a matter for clinical judgement. Clinicians may underestimate the effectiveness of adaptive mechanisms, particularly with chronic anaemia, relying on the measurement of the Hb concentration alone.

Case Study 2

A diluted sample leads to unnecessary transfusion

The laboratory received a sample for FBC on 23.3.01, Hb was 108g/L. The laboratory received a second sample on 1.4.01, Hb 54g/L. The result was queried with the medical officer who insisted that the sample was correct and that the patient had been bleeding. Four units of blood were requested and transfused. The post transfusion Hb was 182g/L. In retrospect it was realised that the biochemistry department had refused to issue results on the sample received on 1.4.01 and stated that it appeared to be diluted.

Failure to request the appropriate component (33)

In 33 cases there was failure to request the appropriate component. Once again the most common error was failure to request irradiated components for patients at risk as defined in BCSH guidelines.[1] This included 16 cases where the patients were on Fludarabine, and 1 case where the patient was on deoxycoformycin, 6 cases of Hodgkins disease, 2 cases of DiGeorge syndrome, and 5 cases where a neonate had undergone a previous intra-uterine transfusion (IUT). No instances of TA-GVHD resulted from these omissions. Two cases involved omitting to request CMV negative components. 1 case involved an inappropriate request for anti-D.

Interestingly this year, in answer to the question 'As a result of this error have there been recommended changes to transfusion procedures?' 2 laboratories have brought the hospital pharmacy into the procedural chain. In one laboratory the pharmacy informs the blood bank of all patients prescribed purine analogues and will not dispense the drug until they have confirmed that the patient is flagged to receive irradiated components. In another laboratory the blood bank head contacts pharmacy to ensure they have been notified of all patients on purine analogues. Unfortunately in a third case the notification system already in place involved pharmacy and failed.
Another laboratory expressed their frustration at the inability of record systems to identify fetuses as individuals. They felt that a national initiative e.g. allocating a NHS number to fetuses undergoing treatment, would reduce the errors of failure to irradiate blood components for those undergoing IUTs.

Case Study 3

Computer downtime contributes to a wrong blood incident

A 19 year old man with acute lymphoblastic leukaemia required a transfusion of red cells. The request form did not stipulate that the blood should be CMV negative and irradiated. The hospital information systems were being relocated and therefore the historical record could not be accessed. The error was not noticed at the time of administration and only discovered during retrospective update of transfusion computer records.

Case Study 4

Patients should be better informed

A patient with anaemia was admitted to hospital whilst on holiday and required a blood transfusion. Staff were unaware that she had previously been treated with Fludarabine and therefore required irradiated blood components. Had the patient been aware of her previous treatment, and that this information should be passed on, this incident might have been avoided.

Case Study 5

Failure of communication between hospitals places a neonate at risk

An infant who had previously had an IUT was transferred from a tertiary referral centre back to the referring hospital and was transfused with non irradiated red cells as no transfusion history had been given either by the local clinicians or the specialist centre.

Case Study 6

Robust procedures must be in place for autologous donations

A 63 year old lady requested pre-deposit autologous donation for her total knee replacement. Two units were collected at the hospital. The paperwork giving details of the autologous donation was never completed or sent to the laboratory, nor was the laboratory telephoned. On admission for surgery 3 units of allogeneic blood were crossmatched for the patient. Despite the patient's notes having a prominent red label stating that autologous blood had been collected, the first unit of allogeneic blood was given to the patient. The red sticker was then noticed and the patient went on to receive 2 units of her own pre-deposited blood. The Trust concerned has now put a system in place where the nurses at the pre-admission clinic inform the blood bank, one week before surgery when patients have given autologous units.

Case Study 7

Laboratory staff issue platelets of the wrong blood group as they are not informed that the patient has undergone a bone marrow transplant

The blood bank did not know that a group O RhD positive patient with chronic myeloid leukaemia (CML) in blast crisis had previously undergone a bone marrow transplant from a group A RhD positive donor. The laboratory therefore continued to issue O RhD positive platelets, a total of 7 adult doses, until a sample was sent for grouping and a new group was detected from a mixed field appearance.

There was only 1 telephone request error this year, although a telephoned laboratory result culminated in an unnecessary transfusion. It is unclear whether the result was given incorrectly or recorded incorrectly.

Case Study 8

Care must be taken over telephoned requests and nurses must wait for prescriptions to be written

A telephone request for 20% salt poor albumin was made by a house officer. The albumin was issued and labelled according to the patient details given by the doctor. Two nurses checked the albumin on the ward and the infusion was commenced on the patient for whom it was issued although the prescription had not yet been written. One of the nurses contacted the doctor to remind her to prescribe it when the doctor realised that she had requested the albumin for the wrong patient The infusion was stopped immediately, after 45mL had been given.

Hospital Blood Bank Errors

One hundred errors in this category occurred in 80 case reports. This is an increase in laboratory errors of 16.3% over last year and these errors now account for 29.1% (100/344) of total errors. This year the largest number of cases (36% or 69 out of 190), although not the largest number of errors, originated in the hospital blood bank. In many cases errors made within the laboratory cannot be picked up further down the transfusion chain, although in some cases involving 'special requirements' they should be picked up by the staff responsible for administering the transfusion.

Of the 100 laboratory errors 53 occurred during routine working hours and involved 50 state registered BMSs, 1 unsupervised medical laboratory assistant (MLA), 1 locum/agency staff and 1 trainee. The 36 errors made by on-call staff involved 17 BMSs who worked regularly in the blood bank and 19 who did not. In the other 11 errors neither the grade of staff nor the time the errors were made was stated. This information is summarised in Figure 20. Table 18 gives more detail about the errors and grades of staff involved.
36% of laboratory errors occurred outside normal working hours. As stated in last year's report[9] it is not possible to comment on the significance of this information in the absence of relevant denominator data.

Figure 20
Circumstances under which laboratory errors occurred (n=100)

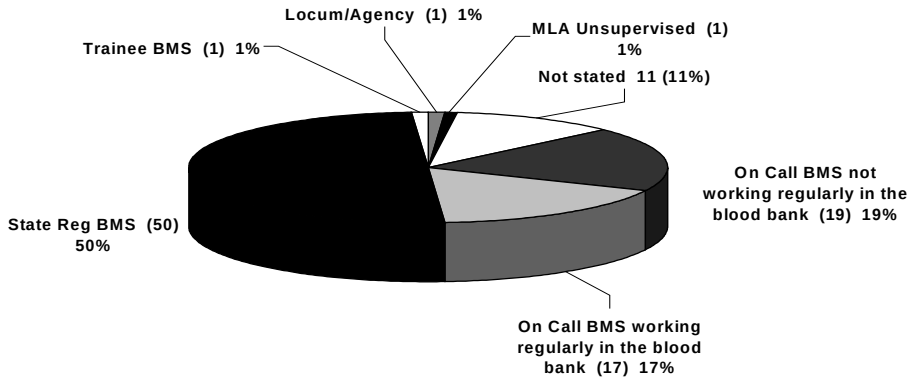


Table 18
Laboratory errors and grade of staff involved (n=100)

Error	Total number of errors	State registered BMS, routine, regularly working in blood bank	State registered BMS, on call, regularly in blood bank	State registered BMS, on call, not regularly in blood bank	Other staff	Unstated
Sample transposition	**3**	1		2		
Failure to consult/heed historical record	**11**	5	3	2		1
Incorrect group	**10**	2	2	4		2
Missed antibody(ies)	**7**	2	2	3		
Missed incompatibility/crossmatch error	**4**	1	2	1		
Incorrect labelling of component	**5**	5				
Selection/issue of inappropriate component	**20**	11	3	3	1	2
Failure to clear satellite refrigerator	**7**	6				1
Failure to irradiate	**7**	4	1		1	1
Clerical error	**8**	4	2		1	1
Other procedural error	**13**	6	2	3		2
Other [1]	**3**	2				1
Unknown [2]	**2**	1		1		
Total	**100**	**50**	**17**	**19**	**3**	**11**

[1] 1 x Failure to maintain proper stock levels; 1 x Failure to input into computer telephoned special requirements; 1 x Failure to tell Blood Centre of special requirements;
[2] 1 x Unable to determine the source of the error within the laboratory; 1 x possible wrong haemoglobin result given out but unable to confirm

The increase in number of laboratory errors is predominantly in the categories:

'Failure to consult/heed historical record'	11 errors this year against 5 last reporting year.
'Selection/issue of inappropriate component'	20 errors this year against 12 last reporting year.
'Incorrect serological reasoning'	6 errors this year against 1 last reporting year.
'Failure to clear satellite refrigerators'	7 errors this year against 1 last reporting year.

These areas will be discussed first.

Failure to consult/heed historical record (11)

This category consisted almost entirely of failure to select irradiated components when the patient records clearly stated that irradiated units were required. In one case the historical record could not be accessed due to computer downtime. It is essential that a record of patients with antibodies or special requirements can be accessed during computer downtime, whether this is in a hard copy format or input into an excel or access file that can be accessed by a PC separate from the blood bank computer system.

Selection/issue of inappropriate component (20)

These errors involved issuing expired components or not selecting the correct antigen negative units for patients with known antibodies. It was of particular concern that some laboratories reporting other errors had not selected antigen negative units for the crossmatch yet did not report this as an error.

Case study 9

Acute renal failure as a result of Fya incompatibility

3 units were requested for a patient who had fallen downstairs and required urgent neurosurgery. The patient was O RhD positive and had an anti-Fy^a. Six units were crossmatched and 3 were found compatible and issued without Fy^a typing. The patient was transfused with all 3 units and then suffered renal failure and required ICU admission, definitely due to the transfusion. The patient recovered with no long term ill effects. The report states that the probable cause of the reaction was a transcription error in the result of the crossmatch and an incompatible unit was labelled as compatible. The laboratory does not seem to have considered the possibility that a crossmatch compatible unit could have been Fy^a positive (weak expression) and missed on the crossmatch. It is possible that the urgency of the situation did not allow for Fy^a typing, but Fy^a typing should have been performed retrospectively.

BCSH guidelines[37] state that 'Blood should be selected which has been tested and found negative for the relevant antigen' when there is a clinically significant red cell antibody. The guidelines do say that ' the recipient's need for immediate red cell support may dictate that pre-transfusion testing is abbreviated', but if this is the case this should be 'stated on the compatibility report.'

Incorrect serological reasoning (6)

This category includes the following examples: two cases where group O FFP was selected for group A patients. A case where RhD positive platelets were supplied by the regional Blood Centre for a RhD negative patient due to a shortage of RhD negative platelets. The hospital was apparently not informed of this. These were then issued to a RhD negative, 8 year old female without anti-D cover, by an unsupervised MLA. This resulted in the individual producing anti-D. All platelets are now issued by BMSs at this hospital. The third case is described below:

Case Study 10

Incorrect serological reasoning and technical errors combine to cause an incompatible transfusion

A 22-day-old baby was transfused with O RhD negative blood, despite a warning on the computer of maternal anti-c+E, because the BMS was of the mistaken belief that maternal antibodies did not persist for long after delivery. The BMS then went on to obtain a false negative antibody screen and a false negative crossmatch, no explanation was given as to the reason for these errors which were detected the following day.

It is of concern that this 22 day old neonate with anti-c+E was transfused routinely for anaemia of prematurity, outside normal working hours.

Clearing main and satellite blood refrigerators (7)

There were 7 errors in this category. Many involving the transfusion of expired units that had not been cleared from the blood bank.

Case Study 11

All blood banks must be cleared regularly

A unit of blood that had expired 2 weeks ago was transfused. It had been left in the blood bank refrigerator when unused previously. The nurses checked the day of expiry but not the month – it expired on 17th October 2000 and it was now the 1st November 2000.
To the question 'As a result of this error have there been recommended changes to transfusion procedures?' The answer was: 'SOPs rewritten to include checking expiry dates, nurses retrained'. Nothing was mentioned about laboratory staff failing to clear the blood bank. It is important that, when reviewing procedures in the transfusion chain, all links are examined.

Grouping errors (10)

There were 10 errors in blood grouping; 4 in ABO typing and 6 in RhD typing. Only 2 laboratories could give an explanation as to how these errors occurred. One was thought to be due to 'splash' when using a microplate method, which led to a false positive RhD type, and in one case the correct result was obtained but entered incorrectly into the blood bank computer.

Case Study 12

A manual transcription error results in transfusion of Rh incompatible red cells

A rapid group, antibody screen and crossmatch were performed for a routine transfusion during normal working hours. The group was performed correctly but a transcription error resulted in the wrong RhD status being recorded with the consequence that group O RhD positive red cells were issued to a group O RhD negative patient. The error was noted on subsequent routine grouping. The patient was transfused with one unit and survived with no ill effects.

Antibody screen errors (4)

There were 4 cases of antibody screen errors. No explanation could be found to account for the false negative antibody screens which resulted in a missed anti-D, a missed anti-c+E and a missed anti-c. RhD negative units were transfused in the first case and there were no adverse events following transfusion of c positive units in the other 2 cases. In 2 of the cases the BMS involved was retrained, and in another the BMS was relieved of on call duties until retraining was complete. All 3 cases occurred out of hours and all 3 errors were picked up on routine retest the following day. The case where anti-D was missed was for a routine colonoscopy yet was tested outside normal working hours. On one occasion the antibody screen was omitted, with no explanation.

Antibody identification errors (3)

These cases included a missed anti-c in the presence of an anti-E. Interestingly this blood was crossmatched for an elective total hip replacement and yet the laboratory obtained the sample too late to send it for antibody confirmation before surgery. Another case involved a missed weak anti-Fy^a in the presence of an anti-Lu^a. Both these errors were picked up by the reference laboratory when samples were sent for confirmation of antibody specificity, which was the usual policy of the laboratories involved. Neither patient suffered any adverse sequelae. The third case is given below:

Case study 13

Antibody identification error leads to a K incompatible transfusion

An on call BMS was asked to crossmatch 4 units for a patient with chronic renal failure and anaemia (Hb 60g/L). The antibody screen was positive and one of the units incompatible. He suspected that the antibody was an anti-S but the units were not S typed prior to issue. He contacted the senior house officer (SHO) and said that 3 units were compatible but one was not and that further investigation would take place the following morning during routine hours. The SHO asked for the compatible units to be issued forthwith. Approximately two hours after starting the first unit the patient exhibited a mild reaction of fever and malaise. This information was conveyed to the BMS and it was suggested that the transfusion should stop and the reaction should be reported and investigated. Investigation during routine hours identified the antibody as anti-K and the unit causing the reaction was K positive. The unit thought to be incompatible was in fact compatible.

This case was thoroughly investigated locally and sound recommendations were made based on BCSH guidelines. There were a number of errors:

1. The BMS did not follow the local procedure for issue of blood where the antibody screen is positive. In such cases the requesting doctor should be informed that compatible blood cannot be guaranteed and that if blood is required urgently it should be discussed with the on call haematologist. The SHO involved confirmed that he was not asked to delay transfusion but would have done so if asked.
2. The BMS did not type the units for the relevant antigen.
3. There must have been a transposition or transcription error during crossmatch as the single incompatible unit was labelled as compatible.

The BMS acknowledged the seriousness of his failure to adhere to written procedures but in mitigation pointed out that the error occurred at 01.40 am whilst he was busy and tired. Again, it is of interest that the transfusion could have waited until the following morning.

Crossmatching errors (7)

These included a case where a patient had known anti-E+K but the BMS failed to select E and K negative units and then obtained a false negative crossmatch by failing to add the plasma to the card IAT test. The patient recovered from the effects of intra-vascular haemolysis. Another case involved the transposition of samples from two patients with the same surname.

Telephoned request errors (1)

One incident involved a doctor telephoning a new requirement for irradiation and the BMS jotting this down on a notepad but forgetting to input it into the computer. As a result the laboratory policy was changed and a ‘Change of Requirements’ form must now be completed and faxed to the transfusion laboratory.

Labelling of blood components errors (5)

Labelling errors occurred, most commonly affecting platelet packs, which may indicate that less care is taken with labelling products that do not require serological testing. The labels for two packs were simply switched. One laboratory has since implemented a policy where 2 members of staff must check the labelling of platelets which, although a solution in normal working hours, may prove difficult out of hours when fewer staff are on duty. In all cases the initial error made by the laboratory was not picked up at the collection or administration stage.

Failure to detect errors made at the regional Blood Centre (2)

There were 2 instances where the blood centre failed to irradiate human leucocyte antigen (HLA) selected platelets and the hospital BMS then also failed to notice that they were not irradiated.
There was one instance where a CMV positive platelet was labelled ‘for neonatal use’, contrary to UKBTS “Red Book” guidelines[41] (see case study 16).

Errors in the collection and administration of blood components (172)

One hundred and seventy two errors occurred in 104 case reports (50% of all errors).

Collection of incorrect component (29)

Table 19
Collection errors according to grade of staff involved and whether or not a formal check was made at this stage (n=29)*

GRADE OF STAFF	FORMAL ID CHECK		
	Yes	**No**	**Unstated**
Registered Nurse	3	6	1
Unregistered Nurse	0	2	0
Porter	2	9	0
Theatre Staff	0	1	0
Other [1]	2	2	0
	7	**20**	**1**

* One reporter did not respond to this question
[1] 1 ODA; 1 doctor; 1 HCA (trained); 1 support worker

This is still a significant area of error but there appears to have been some improvement since last year with 29 errors this year compared to 46 reported last year. This year there are fewer cases in which the hospital is reporting lack of formal ID check at the point of collection. Although we cannot be certain, this could be because more hospitals now follow BCSH guidelines[4] and have a written protocol for collection of blood components that includes a formal ID check. The majority of errors in collection are made by porters and nurses and this presumably reflects the fact that these are the 2 main groups of staff responsible for blood component collection, although this is not certain due to the lack of denominator data.

This year there were 2 errors involving 'flying squad' emergency O RhD negative blood. In one instance 'flying squad' blood was taken and transfused to a neonate rather than the irradiated, crossmatched unit that had been prepared and was in the same refrigerator. In another instance, rather than collecting 2 flying squad units, one unit of O RhD negative blood and one unit of A RhD negative blood were taken. These units were then transfused into a group B RhD positive patient. The patient died from the underlying condition.
On 2 occasions blood crossmatched for maternal use was collected and transfused to her infant. In one case the doctor in charge made a clinical decision to transfuse in a medical emergency although the wrong unit (i.e. maternal) had been collected in error. This clinical decision was not in itself regarded as an error. On another occasion a nurse sent to collect 'flying squad' blood actually collected the blood crossmatched for the mother and it was transfused without any formal bedside check. Although laboratory staff do not feature in Table 19, they were involved in handing over blood components to porters without a formal check in at least 2 cases.

Failure of bedside checking procedure (82)

In one case in this category, a unit of blood was collected for the wrong patient from a satellite refrigerator in an emergency. The unit was checked against the paperwork which accompanied it but at no stage were any details checked against the patient's wristband or notes. The error was discovered approximately half way through the transfusion of group B RhD negative red cells to a group O RhD positive patient. This elderly man was already very ill and it is not clear whether this major ABO incompatible transfusion was partly responsible for his death several days later.

Table 20
Outcome of bedside errors (82)

Category	Survived/ no ill effects	Major morbidity	Died unrelated to tx.	Died possibly related to tx.	Died probably related to tx.	Died definitely related to tx.	Unknown	Total
Major ABO incompatibility	9	1 [1]	3	1	0	0	0	**14**
RhD incompatible	5	0	0	0	0	0	0	**5**
ABO/RhD compatible[2]	28	0	2	0	0	0	0	**30**
Special requirements not met	21	0	1	0	0	0	2	**24**
Inappropriate transfusion	6 [3]	0	0	0	0	0	0	**6**
Anti D	3	0	0	0	0	0	0	**3**
Total	**72**	**1**	**6**	**1**	**0**	**0**	**2**	**82**

[1] Recovered from intravascular haemolysis
[2] includes 2 cases of right blood to right patient
[3] 4 x expired RBCs; 1 x expired platelets, 1 x wrong concentration of albumin

Table 21
Grades of staff involved in bedside incidents (n=82)

Grade of Staff	Number of cases
Registered nurse & registered nurse	51
Registered nurse and unregistered nurse	2
Registered nurse & doctor	1
Registered nurse and unknown	1
Registered nurse only	9
Doctor & doctor	1
Doctor & other [1]	3
Doctor & unknown	1
Doctor only	2
Other only [2]	1
Unstated	10

[4] O.D.A.
[5] Trauma team

This year we have introduced the category 'special requirements not met' for bedside errors (24 cases). This category refers to errors, made earlier in the transfusion chain, which it is felt should have been noticed by those staff performing the bedside check, either because it was written on the prescription, in the notes, or because staff on specialist wards, for example haematology/oncology wards or neonatal intensive care units (NICU), should have been aware of the patient's special requirements in terms of irradiation or CMV status.

If this category is excluded from the total, the number of bedside errors is 58, a reduction on the previous year's total of 87, suggesting, but by no means statistically proving, a reduction in the number of basic patient identification errors. It is interesting to note that many hospitals still have 2 person checking at the bedside, contrary to BCSH guidelines.[4] Without denominator data on the proportion of single versus two bedside checkers, it is impossible to make any further comments on the significance of these findings.

Case study 14

A bedside error highlights inadequate procedures and protocols

Two patients required blood transfusions on the same day. Blood for patient A was removed from a satellite refrigerator and checked in the treatment room by two nurses. One nurse then took the blood to patient B and commenced transfusion without any further checks. Fifteen minutes later an auxiliary nurse noted patient B to be flushed and unwell and summoned assistance. Transfusion was stopped and the patient treated for the transfusion reaction which resulted from transfusion with a group A RhD positive unit to a group O RhD positive patient.
The following issues were noted by the local investigator:

1. The procedure for the administration of i.v. fluids had not been followed and there was no procedure specifically for the administration of blood.
2. Blood had not been checked at the bedside nor had the patient's identity been confirmed against the blood component by either of the 2 nurses involved.

The hospital submitted a copy of their new policy to the SHOT office. It is felt that the document has some weaknesses and serves to highlight how difficult writing local policies can be. The procedure states:

1. 'Check the blood product prescription, the patient's name, date of birth, blood group, unit number of blood and expiry date with two nurses and against the prescription chart.
2. Check the patient's name and date of birth at the bedside on the patient's identity band.' Unfortunately the above statements do not emphasise the most important cross check of the **patient identification** on the **blood component** against the **patient identification** on the **wristband.**
3. Explain the procedure to the patient and obtain their consent – surely this should be done before the blood is brought to the ward so that the blood can be checked at the bedside and commenced immediately following the check. If the patient does not consent the blood could be out of the refrigerator for longer than the requisite 30 minutes.

The policy referenced articles published in 1992 and 1995. We urge staff to review policies based on **recently** published guidelines.[4]

Problems with identification wristbands

In 11 cases wristbands were missing although in 1 case this omission was not considered to have contributed to the mis-transfusion. Analysis of the circumstances revealed that 4 involved outpatients all of which were associated with bedside errors and 5 occurred in theatre together comprising approximately 82% of instances. In the 10 cases associated with bedside errors there were 4 ABO/RhD compatible, 3 ABO incompatible and 2 RhD incompatible transfusions.

Inappropriate transfusion episodes

There were 6 of these of which 4 involved expired red blood cells, 1 expired platelets and 1 wrong concentration of albumin.

Errors originating at the supplying blood centre

There were 8 errors in this category occurring in 7 case reports

- 2 x Transport errors.
- 2 x Failure to irradiate HLA matched platelets.
- 1 x Incorrect RhD typing.
- 1 x Supplied short expiry platelets over Christmas period despite request for longer expiry.
- 1 x Supplied inappropriate product.
- 1 x Did not follow Red Book guidelines in production.

Case Study 15

Failure to give clear delivery instructions initiated a chain of errors

A patient was admitted to A+E with gunshot wounds. The on-call BMS requested 10 units of red cells and 4 adult doses of platelets from the RTC. The blood components were delivered directly to A+E by a taxi driver. The patient had already gone for surgery and a porter took them to theatre where they were transfused to the patient. The on-call BMS contacted the RTC to enquire about the delivery and was told that all the components had already been delivered. The delivery note was tracked down in theatre and the empty packs returned to the blood bank later that

day. All components were transfused not only without any proper identification but also without any laboratory checks or audit trail.

Case Study 16

Erroneous labelling highlights an IT loophole

A unit of paediatric platelets was issued to a hospital. The label stated 'Platelets, apheresis, leucocyte depleted for neonatal use'. However the CMV status was not given on the bag. An inexperienced member of staff issued the unit and it was transfused. Subsequent investigation revealed that the unit was CMV positive and a 'loophole' in the NBS PULSE computer system allowed CMV positive units to be labelled up for neonatal use, contrary to the requirements of the UKBTS "Red Book" guide.[41]

Errors in anti D administration

Errors occurred at all points in the transfusion chain, as with blood components. These errors have been grouped together this year to give an overall picture of mistakes made in anti-D administration.
There were 17 errors in anti-D administration reported this year compared to 12 last year.
Three of these errors were due to laboratory errors in RhD typing and in one additional case it could not be ascertained whether there had been a grouping error or an error in taking the sample, as the sample was no longer available for retest. Further laboratory errors included: failure to check the RhD status of the baby prior to issuing anti-D (2 cases), issuing anti-D when anti-tetanus immunoglobulin was requested; a mistake which went unnoticed by the administering nurse, and issuing anti-D to a 'D^u positive' patient due to incorrect serological reasoning. National recommendations[7] are quite clear on this point: 'Women who have weak expression of the RhD blood group (D^u) do not form anti-D and do not therefore require prophylaxis.'

Two cases involved misidentification or no formal identification of the patient at the bedside resulting in the wrong patients being given anti-D.
Anti-D is often kept on maternity wards or in antenatal clinics. It is administered by the midwife/GP and is then entered retrospectively onto the blood bank computer. A number (6) of communication and clerical errors have arisen in this process including: administering anti-D based on a verbal blood group given by the patient (against the local, written protocol) which was found to be incorrect 5 months later; not checking the blood group prior to administration on 2 occasions; 2 cases where the RhD type of the patient had been handwritten incorrectly in the notes and a case where a 'negative' result was obtained from the laboratory computer but for an entirely different test, not the RhD status.
The final case contained multiple errors:

Case Study 17

Multiple errors resulted in inappropriate anti-D administration

250iu anti-D was requested for a patient who was stated in error to be RhD negative and had suspected abdominal trauma at 34 weeks gestation. The laboratory staff, realising that the requested dose was incorrect, issued a 500iu dose of anti-D, but failed to check the historic group of the patient which was RhD positive, and also failed to request a repeat sample.

This case contains a number of errors: 2 requesting errors (the wrong RhD type and wrong anti-D dose given on the request form); 2 laboratory errors (failure to look up an historic blood group and failure to ask for a sample for fetomaternal haemorrhage estimation (FMH) – which would have been required had the patient been RhD negative). Recommendations[7] are again clear on this point: 'For all events after 20 weeks gestation 500iu anti-D Ig should be given followed by a test to identify FMH greater than 4mL red cells; additional anti-D Ig should be given as required.'

Errors which did not fit into existing categories (13)

There were 13 errors in 11 cases which could not be placed into existing SHOT error categories and they highlight some important issues.

- Two cases involved the infusion of albumin. Although these cases did include a bedside administration error, as the expiry of the albumin should have been checked at the time of infusion, the primary error was in poor stock control and it was impossible to determine who was responsible for maintaining the stock. Stocks of albumin and all blood products must be properly maintained and have a complete audit trail. A written protocol must be in place which clearly defines responsibility for a task.

- Two cases involved communication failures between the ward and the hospital laboratory. The SHOT standing working group is discussing whether 'communication failure' should be a category in subsequent reporting years as poor communication does contribute to a number of IBCT cases.

- One mis-transfusion probably occurred as a result of a Hb result having been recorded incorrectly in the notes, again showing that simple clerical errors can have serious consequences.

- One case involved a patient with duplicate registrations. The sample and request form were correctly labelled and matched the details on the hospital database. However, following computer checks 6 weeks later, it was found that the patient had been registered twice with two different dates of birth. Two members of staff has checked the units at the bedside but had failed to note the incorrect date of birth, which was later than the patient's real date of birth by 25 years. This was a case of right blood to right patient and the patient suffered no ill effects.

- There were a further 7 errors 3 of which involved invalid Hb results leading to unnecessary transfusions but for which the reason for the invalid result was not known and 4 in which the source of the error could not be determined.

Outcome

Of the 190 fully analysed cases there were 26 cases of major ABO incompatibility, including 1 case which was also RhD incompatible. There were 17 cases of RhD incompatibility, 8 cases where other red cell antigen incompatible transfusions were given, and 47 incidents which resulted in ABO and RhD compatible transfusions of which 3 were cases of "right blood to right patient" despite procedural errors.

The remaining cases comprised 50 cases of failure to provide for special requirements (42, non-irradiated, 5 not irradiated and not CMV negative and, 3 not CMV negative), 17 cases of anti D immunoglobulin given in error and 24 cases of an inappropriate or wrong component transfused. There was additionally 1 case where the laboratory issued O RhD positive platelets for a patient who had received a group A RhD positive bone marrow transplant.

- 1 death was possibly related to major ABO incompatibility and two others possibly related to an unnecessary transfusion
- 19 patients died of causes unrelated to the transfusion incident
- 3 patients recovered from the effects of intravascular haemolysis
- 1 RhD negative female of child-bearing potential was exposed to RhD positive red cells and produced anti-D
- 2 patients suffered major morbidity as the result of other red cell incompatibility
- 160 patients survived with no lasting effects
- in 2 cases the reporter did not state the outcome of the patient

The outcome of all IBCT cases is summarised in Table 22

Table 22
Outcome of cases of IBCT (n=190)

Category	Survived/ no ill effects	Major morbidity	Died unrelated to tx.	Died possibly related to tx.	Died definitely related to tx.	Outcome unknown	TOTAL
Major ABO incompatibility [1]	17	3 [2]	5	1			**26**
RhD incompatible	15	1 [3]	1				**17**
ABO/RhD compatible [4]	42		5				**47**
Other red cell incompatibility	6	2					**8**
Inappropriate transfusion	20		2	2			**24**
Special requirements not met [5]	42		6			2	**50**
Anti-D	17						**17**
Other	1						**1**
Total	**160**	**6**	**19**	**3**	**0**	**2**	**190**

[6] Includes 1 case which was also RhD incompatible
[7] Recovered from intravascular haemolysis
[8] RhD sensitisation in female of child bearing potential
[9] Includes 3 cases of procedural failure but "right blood to right patient"
[10] CMV negative/irradiation

Procedural review

Table 23
Hospital Transfusion Committees (n = 190)

Number of responses	Response
4	No response
112	No, but will be discussed at a future meeting
63	Yes
7	No Transfusion Committee in place
3	Unknown
1	No Transfusion Committee but will be discussed

Table 24
Summary of changes made to policies/procedures

Number of changes	Summary of change
46	Changes implemented to documentation; collecting, handling; laboratory techniques/procedures; ward procedures/protocols; administration
16	Implementation of new/additional training
23	Review of existing policies/procedures/protocols
6	Upgrade or renewal of equipment, including computer
12	Reiteration of existing procedures
1	Hospital Transfusion Committee to be established
1	More clinical for vetting of blood components
3	Patients issued with cards highlighting their need for irradiated blood

Table 25
Summary of comments made by reporters who said that no changes had been made or who did not respond to the question

Number of comments	Summary of comments
7	Procedure correct/no changes made but staff retrained
1	Case being reviewed by Hospital Incident Panel, likely to recommend appropriate remedial measures
2	No changes made but SOPs reinforced
5	No changes made but guidelines are under review
3	Reiteration of existing procedures
1	Recognise the need for improved communication
2	No but Transfusion Committee to review
1	Corrective action taken
2	Review pending
1	Equipment fault pending
1	Simple case of hospital procedure not being followed
1	Ongoing problem in a very active haematology unit

COMMENTARY

- This is the fifth consecutive year in which the single most important cause resulting in mis-transfusion was failure of some aspect of the bedside checking procedure (82 out of 344 errors or 23.8%). Contributory factors were similar to those reported previously, for example confusion over patients with the same or similar names, checking remote from the patient's bedside, interruption between completion of the checking procedure and administration of the transfusion and failure to note discrepancies between compatibility and donation labels where a preceding laboratory labelling error had occurred. The most common error in this category is still checking the unit for transfusion away from the bedside, contrary to recent BCSH guidelines.[4] It is not possible to draw conclusions from available data regarding the safety of one or two person checking procedures.

- *Multiple errors in 52.4% of reports indicate that problems still exist at all levels of the complex, multi-step, multi-disciplinary transfusion chain.*

- The withdrawal of the wrong component from its storage location continues to be a problem. The majority of errors in collection are made by porters and nurses and this presumably reflects the fact that these are the 2 main groups of staff responsible for blood component collection, although this is not certain due to the lack of denominator data.

- It is still not universal practice to use unique patient identification wristbands at the bedside. Nine of the 10 instances where wristbands were missing, and were felt to have contributed to the wrong blood incident, were in outpatient departments and theatres.

- There were 33 failures to request appropriate components for blood transfusion of which the most common was failure to request irradiated components for those patients at risk from TA-GVHD. Contributory factors included failure to supply relevant clinical information on request forms and failure of communication between hospitals when transferring patients. In addition it is suggested that supplying patients with important information regarding their treatment might mitigate against errors of this type.

- Laboratory errors contributed 29.1% of total errors. Errors were made both during routine hours (53%) and out of routine hours (36%), with 11% of cases not giving the timing. They affected emergency (34.7%) and routine (59.4%) requests for transfusion with 5.8% of reports not stating the circumstances of the error. Errors were made both by BMSs who work regularly in the blood bank and by those who did not. However, lack of basic denominator data on the timing and location of errors does not allow any further interpretation of these findings. There are still occasional instances of unqualified members of staff issuing blood components. A number of errors are also occurring in the issue of Hb results from haematology laboratories.

- Due to the lack of denominator data no firm conclusions can be drawn regarding the circumstances surrounding laboratory errors. Routine laboratory tests are inherently safer than rapid techniques, which are usually manual and require manual entry of results and thus open up opportunities for transposition, transcription and technical errors. There are a number of instances this year in which rapid techniques were used for routine transfusions, presumably because samples were not sent to the laboratory in a timely fashion. Similarly a number of errors that occurred out of hours were for routine operations. Case 6 in the Delayed Transfusion Reaction chapter (Chapter 14) also falls into this category.

- Some laboratories do not appear to be following BCSH guidelines[37] with respect to pretransfusion testing and may be putting patients at risk. Cases 2 and 38 in the Delayed Transfusion Reaction chapter also appear to fall into this category. This ties in with recent figures from the NEQAS BTLP 'Urgent Antibody Screening and Compatibility Testing Procedures' questionnaire which states that 2% of participating laboratories do not comply with guidelines because they rely entirely on the serological crossmatch to establish compatibility, in urgent situations, with antibody screening taking place retrospectively.

- There was no explanation for the majority of laboratory errors and, as a result, in many cases no changes were made to SOPs. More commonly existing SOPs were simply reiterated to staff or staff were given retraining.

- Thirty one errors (31%) were in the categories 'failure to consult/heed historical record' and 'selection/issue of inappropriate component'.

- Errors in administration of anti-D are a cause for concern with mistakes being made throughout the transfusion process.
- Sampling errors remain a small but significant cause of 'wrong blood' incidents whilst errors in Hb samples contributed to a number of unnecessary red cell transfusions.
- Communication problems, including failure by the NBS to give clear delivery instructions to their drivers, contributed to a number of errors.

RECOMMENDATIONS

As in all four previous years the category of "incorrect blood component transfused" represents the highest number of reports (213 or 68.9% of 309 new reports), an increase of 6% over the previous year. Once again, mistakes in collection from the hospital storage site/bedside administration comprise the majority of errors.
There is some suggestion that the rate of rise of new reports may be slowing down and that procedures for formal identification at the point of collection and at the bedside may have improved. It is tempting to surmise that these apparent improvements have arisen as a result of better education and application of new guidelines. However, as SHOT lacks accurate denominator data on blood transfusion practices, there is no statistical evidence to substantiate this and it remains the case that SHOT data points to continuing significant problems in ensuring the safety of the transfusion process.

The complexity of the transfusion process and the difficulties of ensuring compliance with procedures in a large, multi-disciplinary organisation cannot be underestimated. However, the problem of inadequate patient identification procedures in particular may have serious consequences and, as this report has shown, extends beyond the confines of the transfusion process itself to involve other blood samples and potentially drug administration (for example anti D immunoglobulin). It will come as no surprise that, as the same types of errors are occurring each year, many of the following recommendations are the same or very similar to those made in previous SHOT reports.

Wrong blood incidents are without exception avoidable errors and the bedside check is the final opportunity to prevent a mis-transfusion.

Existing procedures should be re-examined for flaws which could lead to systems errors. HTCs should play a key role in this process and should be managerially empowered to do so.
In line with the Department of Health publication "An organisation with a memory"[3] positive learning outcomes, such as highlighting and changing unsafe practices, must be sought from analysis of errors.

It is essential that every institution where transfusions are administered becomes familiar with and puts into practice existing guidelines in the field of blood transfusion to minimise the possibility of human error.
Great care must be taken by hospitals when writing local protocols, based on National Guidelines, to ensure that they are accurate, concise, user friendly and readily available for reference by all staff.
Medical and nursing staff working in specialised units, for example haematology/oncology wards and NICU, must be aware of local and national protocols relating to special transfusion requirements for their patients. It is the responsibility of senior staff in these areas to bring special requirements to the attention of junior staff.

Every hospital must have a formal policy for the collection of blood components from storage sites and these must incorporate formal identification procedures.

Every hospital must have a formal policy for the bedside check which must be rigidly enforced at all times.
This must ensure that blood components are correctly allocated and identified and be capable of detecting preceding compatibility labelling discrepancies. The dangers of staff becoming distracted, even after correct checking, must be borne in mind.

Every patient should be uniquely and positively identified using a wristband or equivalent and there should be no exceptions.
A single, unique identifying number should be used.

Computerised systems are available which will reduce the opportunities for errors at the bedside. Pilot studies of such systems are underway in the UK.
Their potential value beyond the transfusion setting, for example in reducing drug administration errors, should be explored as this will improve their cost effectiveness. Currently serious errors in the use of prescribed drugs account for 20% of all clinical negligence litigation[3] and in a recent Audit Commission report[5] the Department of Health recommendation that steps should be taken to reduce these by 40% by 2005 was reiterated.

Blood banks must continue to be vigilant in reviewing procedures and systems to ensure that they all meet current guidelines. Ongoing staff training is essential to prevent errors in the laboratory.
Transfusion laboratory computer software should be improved to offer better warnings when the component chosen for issue does not meet requirements. For example when 'irradiation' is in a special requirement field it would be helpful if the system could warn the BMS if the selected unit does not have an irradiated component code. A similar warning would be beneficial when a patient has, for example, anti-K in an antibody field if the selected unit is not K negative. Warnings could also be applied to the issue of anti-D based on values in a 'gestation' field, a 'blood group' field and the 'baby's blood group' field.

Hospital transfusion laboratories must have protocols for the timely removal of expired blood from blood banks.
Checking the expiry date remains an important element of the bedside checking procedure to back this up.

Individuals responsible for the prescription and request of blood components must be familiar with the special needs of their patients. These should conform with BCSH and other guidelines and special requirements should be flagged on the clinical and laboratory records.

1. There must be a clear line of clinical responsibility for ensuring that transfusion records are transferred with a patient when they are moved between hospitals, often a referral centre and a local hospital. This must include records for intra uterine transfusion in which instance a copy of the mother's notes should accompany the neonate.
2. Clinicians must ensure that patients are aware of their own special requirements which should be passed on to any other clinician whom they consult. Cards are now available for patients to carry, which Trusts can obtain from the National Blood Services of England and Scotland. These should be issued to patients by their clinicians at the earliest opportunity. If appropriate, other departments within a hospital may be brought into the process in order to improve safety, for example, pharmacy as the issuers of purine analogues.
3. Registration of fetuses may be something that should be investigated as a means to improving neonatal transfusion safety.
4. Guidelines published on the clinical use of red cell transfusions[6] should be disseminated more widely to prescribing medical staff. Every hospital must also have a robust policy for the prescription and issue of anti-D which must be based upon joint BBTS/RCOG recommendations[7] and must include a requirement for printed confirmation of the RhD status of the patient.

Personnel responsible for taking samples for any laboratory test must at all times follow strict procedures to avoid confusion between patients.
This means that samples should be taken one at a time and labelled at the bedside after positively identifying the patient. Sound phlebotomy procedures must also be followed in order to obtain a true sample, for example avoiding dilution of Hb samples.

Telephoned requests for blood components must be formally recorded and incorporate all relevant information including special requirements.
Great care must be exercised when acting on verbal results. Local written SOPs must be in place for dealing with telephone requests.

Baseline data on the timing and location of transfusions in the hospital setting are needed.
The confidential and anonymised nature of the SHOT scheme makes it difficult to place errors in the overall context of transfusion activity in the UK, apart from very broad estimates of the incidence of hazards as a proportion of total blood components issued. The lack of denominator data makes meaningful interpretation of, for example, out-of-hours errors impossible. With the increasing sophistication of blood bank information technology, it is now possible to collect such data and this could be of value in designing improved systems to increase the safety of the blood transfusion process.