7. INCORRECT BLOOD COMPONENT TRANSFUSED

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

As in previous years this category represents the highest number of reports (144 or 57.1% of 252 new cases). This chapter analyses 132 questionnaires plus 4 explanatory letters totalling 136 cases including 5 outstanding from the previous reporting year.

In total, 149 initial report forms were received during the reporting period but 5 were not valid SHOT reports and will not be included in this chapter. Table 6 gives a breakdown of these excluded cases.

Table 6
Excluded cases

1	Was considered to be a near miss event
1	Was withdrawn by the reporter
1	Was a duplicate of an earlier report
1	Was considered to be an acute transfusion reaction
1	Was considered to be a clinical decision rather than an error
5	
144	Valid initial report forms
13	Questionnaires are outstanding and will be analysed next year
131	Questionnaires/ letters plus **5** from last year are analysed in this chapter. **Total = 136**

Sex of recipients

Females	76
Males	60

Age of recipients

Age range	0 days to 94 years
Median Age	59 years

Components Implicated	Number of Cases
Red cells	112
Platelets	11
Fresh Frozen Plasma	5
Cryoprecipitate	2
Cryo poor plasma	1
* Anti-D immunoglobulin	5

* 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 as a result of RhD typing errors.

Table 7
Outcome of 136 fully reported incidents

Outcome	Number of incidents
Death definitely related to transfusion	1
Death possibly related to transfusion	2
Death unrelated to transfusion	10
Major morbidity*	12[1]
Survived with no ill effects	108
** Unknown	3

[1] includes 5 cases recovered from complications of intravascular haemolysis

*Major morbidity was classified as the presence of one or more of the following:

- Intensive care admission and/or ventilation
- Dialysis and/or renal dysfunction
- Major haemorrhage from transfusion-induced coagulopathy
- Intravascular haemolysis
- Potential risk of RhD sensitisation in a female of child-bearing potential

** 3 cases had outcomes unknown at the time of reporting. 1 patient had been referred to another hospital and 1 was still receiving dialysis. In a third case the reporter stated that it had been difficult to obtain co-operation from the relevant consultant.

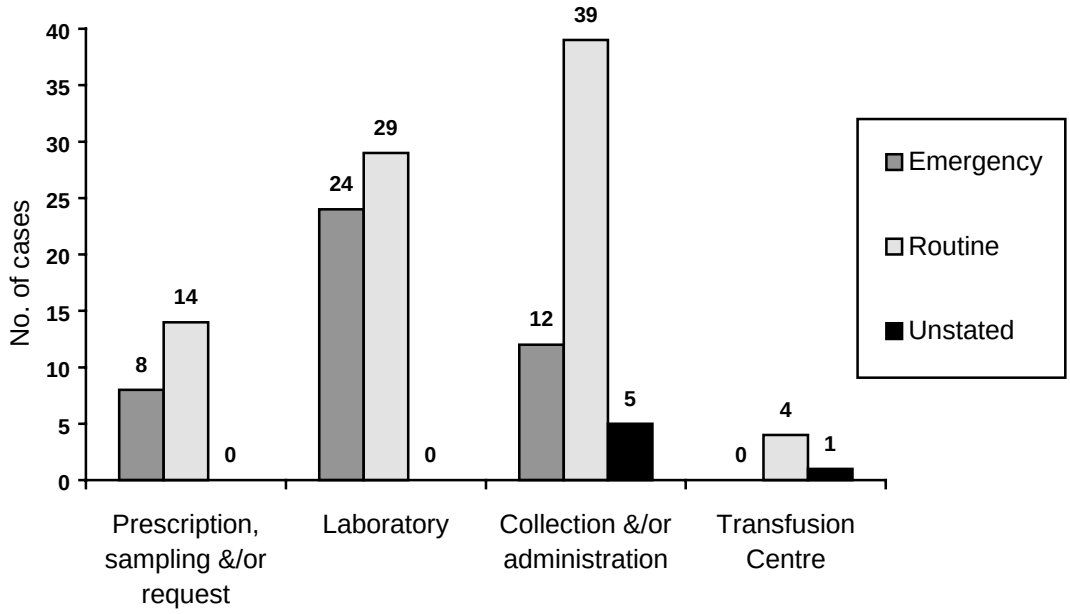
Analysis of reported errors

The questionnaire 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, in order to identify areas for improvement.

The data from 136 completed questionnaires are presented. 5 additional cases were considered but then excluded (see table 6) including one case where, in the presence of known multiple red cells antibodies, a deliberate clinical decision was taken to transfuse in an emergency with unselected red cells. There were no adverse sequelae and in the opinion of the authors this did not constitute a transfusion error, since such medical decisions may have to be taken in emergency situations.

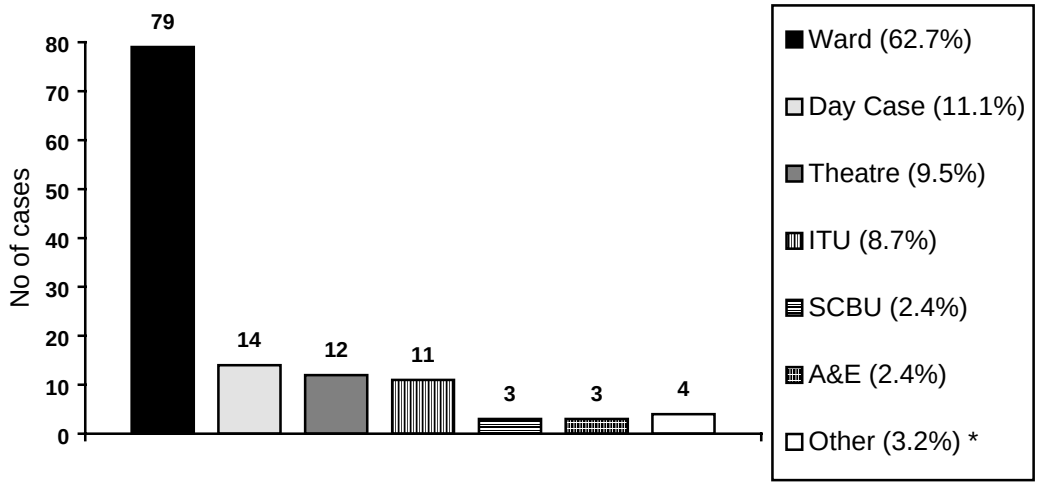
Of the 136 completed questionnaires, 86 related to routine and 44 to emergency transfusions. 6 questionnaires did not state whether routine or emergency. Figure 8 shows the distribution of errors relating to routine and emergency transfusions.

Figure 8
Incidence of errors at the various stages of the process of emergency and routine transfusion (n=136)



The questionnaire asked for information about where the transfusion took place. 126 reports gave information on the site of the transfusion. Unfortunately this information is of limited value as no denominator data are available. Figure 9 summarises this data

Figure 9
Site of transfusion

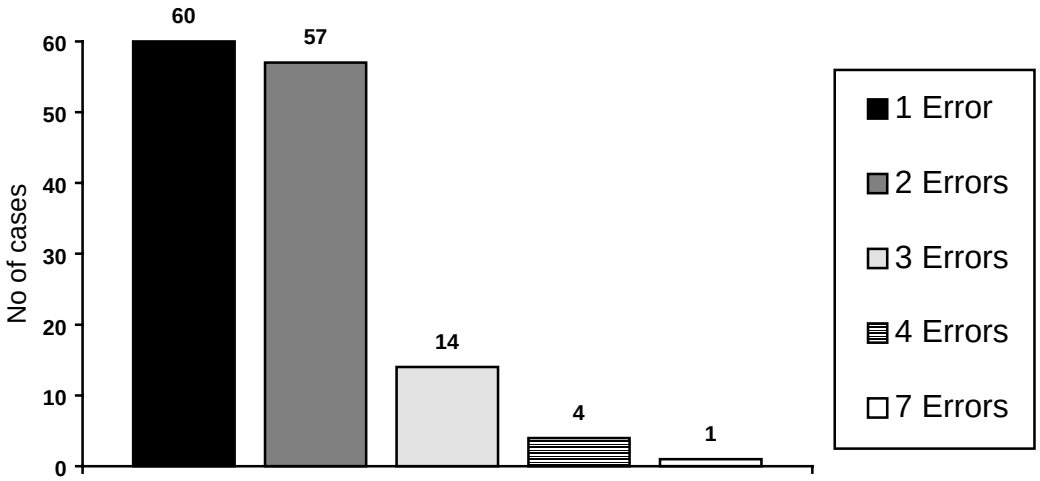


* 1 Acute Assessment Unit
2 Delivery Ward
1 Home address

Multiple errors contribute to many “wrong blood” episodes

Clinicians were asked to report the particular error which had been recognised as the cause of the incorrect transfusion. However, as in the previous two years, closer analysis of the questionnaires revealed that in 55% (75 cases) multiple errors had occurred in the transfusion process such that in 136 fully reported incidents a total of 239 procedural errors was identified. Figure 10 shows the number of errors per case

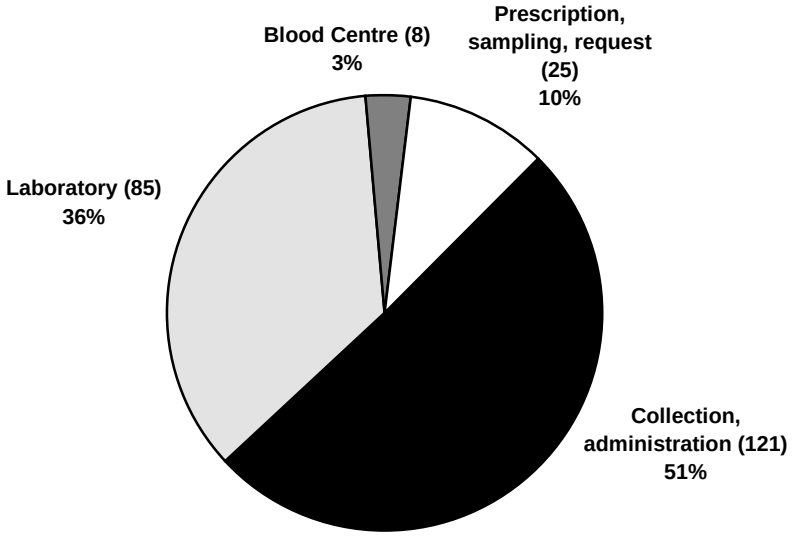
Figure 10
Total number of errors per case (total cases = 136; total errors = 239)



Distribution of errors

The following Pie chart shows the distribution, according to four main reporting categories, of a total of 239 errors from the analysis of 136 completed reports:

Figure 11
Distribution of total errors according to the main reporting categories (n=239)



A more detailed analysis of the distribution of total errors can be found in Table 8

Table 8
Distribution of procedural failures in terms of total errors. (n=239)

Location	Number of errors
Prescription, sampling and request	
Prescription of inappropriate and/or incompatible component	15
Details on request form incorrect	4
Details on sample incorrect	4
Sample taken from wrong patient	2
Total	**25**
Hospital blood bank	
Transposition of samples	5
Failure to consult/heed historical record	22
Incorrect group	15
Missed antibody on screening	2
Missed incompatibility	8
Selection /issue of inappropriate component	12
Incorrect labelling of component	7
Incorrect issue voucher	2
Clerical error	2
Failure to clear satellite refrigerator	3
Other procedural failure	7
Total	**85**
Collection and administration	
Collection of incorrect component	30
Failure of bedside checking process	60
Identification wristband missing/incorrect	16
Inappropriate component selected by clinician	5
Other procedural failure	10
Total	**121**
Supplying blood centre	
Incorrect group	1
Inappropriate component supplied	6
Incorrect serology results supplied	1
Total	**8**

The pitfalls of a complex multi-step, multi-disciplinary process

As has been pointed out in our first two reports, ensuring that the right patient receives the right transfusion at the right time is a complex multi-step process which crosses several professional and managerial boundaries and may involve many individuals. The following analysis of 239 procedural errors occurring in 136 completed reports reveals in more detail how events combined to result in "wrong blood" incidents.

Errors in prescription, requesting of blood components and patient sampling

There were 25 errors in this category occurring in 24 case reports.

Prescription errors

No cases of mis-prescribing were recorded this year although in 4 cases a decision was taken at the bedside to transfuse inappropriate components (see later).

Failure to request the appropriate component

In 15 cases there was failure to request the appropriate component. The most common error was failure to request irradiated components for patients at risk, notably 3 patients being treated with fludarabine, 2 neonates with a history of previous intra-uterine transfusion and 2 patients with Hodgkin's disease. In 3 cases there was failure to request CMV seronegative components (including one failure also to irradiate) for at risk patients; 2 of these were telephoned requests. No instances of TA-GVHD or CMV infection resulted from these errors. In one case there was failure to request Jka negative red cells for a patient with previous anti-Jka, not detectable at that time by laboratory tests. The patient suffered no adverse sequelae. It was not clear from the report whether the length of follow-up would have been sufficient to detect adverse sequelae. In another case a muddled telephone request contributed to the administration of cryoprecipitate in mistake for cryo-poor plasma.

Sampling errors

There were 2 cases involving the taking of samples from the wrong patient.

Case study 1: Failure to securely identify multiple "unknown patient " accident victims

Following a road traffic accident several severely injured casualties were admitted to an Accident and Emergency department. The hospital's policy for the secure identification of unknown patients was not followed resulting in a confusing combination of names and numbers. As a result a group A "unknown male" was transfused with 27 units of group O red cells. No adverse sequelae resulted from this although the patient remained severely ill as a result of his injuries.

Case study 2: Confusion over maternal and neonatal samples and the dangers of using pre-labelled sample tubes

A group O neonate received an emergency transfusion in theatre of group A red cells. The patient had no detectable anti-A and suffered no ill effects as a result of the major ABO incompatible transfusion. The error arose when a doctor at the referring hospital took blood samples which were tested in the hospital to which the baby was transferred for treatment. Samples were dispensed into pre-labelled tubes and maternal blood was placed in both sets of tubes, one of which was labelled for the baby.

Labelling errors

Errors in the labelling of request forms and/or samples were noted on 8 occasions. In all cases multiple errors in the transfusion process contributed to wrong transfusions but in only one case was the sample tube/ request form labelling error directly linked to the transfusion error. In the other 3 cases subsequent laboratory and/or bedside errors contributed to "wrong blood" incidents or other inappropriate transfusions.

Case study 3: Right blood, right patient, by good fortune

For a patient requiring a routine transfusion, incorrect identification details (mis-spelled surname) were supplied on the request form and sample tube. This error was carried through the laboratory documentation and subsequently to the ward. On noticing a discrepancy between details on the blood pack and patient identification details on the ward, the nurse assumed identity from the date of birth and hospital number.
Two other similar cases were noted. In other circumstances such lapses in protocol may have resulted in "wrong blood" transfusions.

Hospital blood bank errors

As in previous years, errors were not restricted to either inexperienced staff or to "out of hours" situations.
Of the 85 laboratory errors noted in 68 case reports, 41 occurred during routine working hours. 39 of these involved state registered MLSOs and 2 errors were made by a driver / health care assistant who had been authorised to collect blood products without reference to an MLSO. 43 errors involved staff working on-call of whom 19 were MLSOs working regularly in the laboratory and 24 were MLSOs who were not working regularly in the blood bank. In one case the grade of staff was not stated. This is summarised in Figure 12. Table 9 gives more detail about the errors and the grades of staff involved. Although 50% of laboratory errors occurred out of hours, in the absence of denominator data for the distribution of work it is not possible to comment on the significance of this finding.

Figure 12
Circumstances under which laboratory errors occurred (n=85)

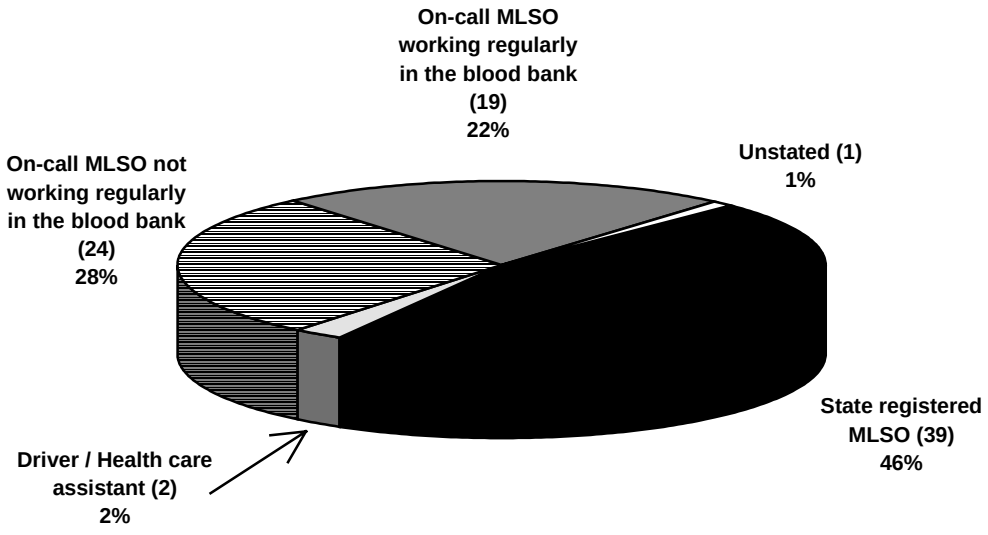


Table 9
Laboratory errors and grade of staff involved (n=68)

Error	Total number of errors	State registered MLSO, routine, regularly in blood bank	State registered MLSO, on call, regularly in blood bank	State registered MLSO, on call, not regularly in blood bank	Other Staff	Unstated
Transposition of samples	5	2	3	0	0	0
Failure to consult/heed historical record	22	10	4	7	1	0
Incorrect group	15	6	3	6	0	0
Missed antibody screen	2	2	0	0	0	0
Missed incompatibility	8	4	3	1	0	0
Incorrect labelling of component	7	3	1	2	0	1
Incorrect issue voucher	2	0	2	0	0	0
Inappropriate selection/issue	12	6	2	3	1	0
Failure to clear satellite store	3	3	0	0	0	0
Clerical error	2	0	1	1	0	0
Other procedural error	7	3	2	2	0	0
Total	85	39	21	22	2	1

Transposition of samples

5 errors fell into this category, 4 resulting in the transfusion of ABO incompatible red cells. 3 patients survived with no ill effects (one suffered an acute transfusion reaction) but one died, possibly related to the adverse effects of the transfusion.

Failure to consult/act on the historical blood bank record

There were 22 of these errors which ranged from failure to note special requirements for irradiation and/or CMV negative components to failure to detect ABO or RhD grouping discrepancies as illustrated in case 4 below. Such errors usually occurred in association with other errors either of request or other laboratory errors.

Case study 4: Failure to check the blood bank record removes a safety net

A 26 year old RhD negative female patient required emergency transfusion. The historical record was not consulted and RhD mis-typing resulted in the transfusion of two units of RhD positive red cells. She was treated with exchange transfusion and anti D immunoglobulin.

Grouping, screening and cross-match errors

25 errors occurred in these categories including 2 clerical errors. There were 13 errors of RhD typing (including the 2 clerical errors) resulting in the transfusion of RhD positive red cells to RhD negative

patients. 3 grouping errors resulted in the transfusion of ABO incompatible red cells, without adverse effects. 2 cases of RhD mis-typing resulted in the unnecessary administration of anti D immunoglobulin to patients who were, in fact, RhD positive. 2 further errors resulted in the transfusion of incompatible FFP, again with no adverse sequelae. Also in this group were 2 instances of missed positive antibody screens and 8 of missed incompatibility. In 2 cases antibody screen and cross-match failed to detect anti-Jka reacting only with homozygous cells. The remaining cases involved failure to detect other red cell antibodies which, in the opinion of the reporters, should have been detected.

Selection of an inappropriate component

This group (12 errors in total) comprised inappropriate selection of RhD positive red cells for a woman of child bearing potential (1 case), incorrect serological reasoning resulting in the issue of incompatible FFP, issue of outdated red cells, failure to irradiate and issue of the wrong component entirely (cryoprecipitate in place of cryo-poor plasma or paediatric FFP). In some cases the bedside check was deemed to have failed but in others it was not clear whether the bedside check would have been expected to detect the error, whilst in one case a deliberate clinical decision was taken to transfuse outdated red cells for a routine transfusion in theatre despite advice from the laboratory to the contrary. No adverse sequelae resulted from any of these incidents.

Case study 5: Incorrect serological reasoning by multiple health care personnel.

Eleven units of group O cryo-poor FFP were issued to a group A patient with thrombotic thrombocytopenic purpura being treated with plasma exchange. An unsupervised health care assistant overrode computer warnings and at the bedside, a nurse and doctor supervised the transfusion of the incompatible plasma. The patient suffered no adverse effects although the direct antiglobulin test became positive.

Incorrect labelling of component and/or issue voucher

9 errors of incorrect labelling of the component and/or issue voucher resulted in 3 ABO and 2 RhD incompatible transfusions. In 2 cases where the label pertaining to the intended unit was attached to a wrong unit, it was questionable whether the bedside checking procedure, if correctly carried out, would have detected the discrepancies.

Case study 6: Erroneous compatibility labelling which resulted in major ABO incompatibility
A group O woman undergoing Caesarean section was transfused with one unit of group B red cells bearing the correct (for the patient) group O compatibility label which had been applied in the hospital blood bank. Bedside checks failed to detect the discrepancy which would have been apparent if the compatibility label details had been compared with the original Blood Centre group label on the pack, which was correct. The patient recovered from the effects of intravascular haemolysis.

Problems relating to satellite storage sites

Failure to clear stocks of components from satellite storage sites resulted in the transfusion of out-dated or incompatible red cells. Whilst some errors were attributed to failures in the hospital blood bank, 3 other errors resulted from failure to heed a satellite refrigerator alarm and its subsequent deliberate deactivation by clinical staff (see 'Other procedural failures' later). These incidents serve to highlight the confusion which surrounds the management of satellite blood component storage areas in some hospitals.

Case study 7: Failure to "de-reserve" blood following an earlier transfusion leads to acute intravascular haemolysis

A patient with a negative red cell antibody screen had been transfused during a surgical procedure five days earlier. A further cross-match was requested for post-operative anaemia, at which stage the patient was found to have developed anti- Jka. Instead of using the newly cross-matched blood, a unit cross-matched five days earlier was taken from a satellite store which should have been cleared of the

"old" blood three days earlier. It was not clear from the report whether the responsibility for this task lay with the laboratory or clinical staff. The patient recovered from the effects of acute intravascular haemolysis.

Other procedural errors which resulted in the transfusion of an inappropriate component

This included computer warnings overridden or ignored, failure to check a blood centre delivery note against the inventory, resulting in the transfusion of an incorrectly stored component, and failure to inform senior laboratory staff of clinical use of an outdated component.

Errors in the collection and administration of blood components

121 errors fell into this category, occurring in 74 case reports.

Collection of incorrect component

30 incidents occurred in this category indicating that, as in previous years, the withdrawal of an incorrect component from its storage site continues to be a significant source of error. Errors were not restricted to specific groups or grades of staff and occurred whether or not formal checks were made at the time of collection. (Table 10)

Table 10
Collection errors according to grade of staff involved and whether or not a formal check was made at this stage (n=30).

GRADE OF STAFF	FORMAL ID CHECK		
	YES	NO	Unknown
Registered Nurse	7	8	0
Unregistered Nurse	1	2	0
Porter	1	5	1
Other		1	1
Unknown		1	2
TOTALS	**9**	**17**	**4**

Collection errors were always followed by failure of some aspect of the bedside checking procedure illustrating how mistakes at this important intermediate stage in the transfusion process set the scene for subsequent errors resulting in "wrong blood" incidents.

Failure of the bedside checking procedure

The 60 incidents which fell into this category comprised 25% of all procedural errors. Fifty cases resulted in "wrong blood" transfusions. In some cases bedside errors were preceded by laboratory or collection errors but the common factor was failure, in some way, of the final, vital bedside check which resulted in mis-identification of the patient. "Wrong blood" incidents resulted in 19 cases of major ABO incompatibility which included one case of earlier mis-labelling in the hospital laboratory. 24 ABO compatible and 6 RhD incompatible transfusions were given and there was one case of administration of anti D immunoglobulin to the wrong woman. Where mis-labelling had occurred in the laboratory, resulting in the application of the correct (for the intended patient) compatibility label to the wrong unit, bedside checks failed to identify the preceding error, as in case study 6 above.

Causes of mis-identification included remote checking of the component at the nurses' station rather than at the patient's bedside, confusion of patients with the same or similar names and failure to check the component label details against the patient. On more than one occasion component details were checked against the accompanying paperwork not with the patient's identity wristband. Failure to follow hospital policies for outpatient transfusions was also noted. Mistakes occurred even when two individuals rather than one were involved in the checking procedure, as can be seen in table 11.

Table 11
Grades of staff involved in bedside mis-identification incidents (n=60)

Grade of staff	Number of cases
Registered nurse & registered nurse	37
Registered nurse & doctor	5
Registered nurse & unknown	2
Registered nurse & unregistered nurse	1
Doctor & other	2
Doctor only	1
Registered nurse only	4
Other only	1

*excludes 7 cases where the grade of staff was not reported

Case study 8: Death from major ABO incompatibility in a patient for whom transfusion had not been prescribed

In this case confusion over two patients with the same surname resulted in the mis-transfusion of a group O patient who, although anaemic, had only been requested for a "group and screen", not cross-match. Following a check on only the surname on the compatibility label the wrong unit was collected from its storage site. Following subsequent failure of the bedside check over 100 ml of group A red cells were transfused. The patient complained of generalised pain and a transfusion reaction was queried but not acted upon. The patient became very ill and died within six hours of the transfusion. After the incident wording on compatibility labels was changed to include "not to be used for patient identification - always check blood against the patient's prescription chart and wristband".

Case study 9: Interruption of the checking process results in a major ABO incompatible transfusion

During a routine inpatient transfusion at night a group O patient received a few millilitres of group A red cells. The patient was not wearing a wristband. Prior to setting up the transfusion two registered nurses checked the blood in the ward treatment room in accordance with local policy. At the end of this process they were interrupted by the need to attend to a patient and in the meantime a further unit of blood for another patient was delivered to the treatment room. On returning the nurse picked up the unit she thought she had checked and connected it to the patient. Minutes later she realised that a final check had not been made and returned to the bedside to discover the wrong unit had been put up. The transfusion was immediately stopped and appropriate action taken. The patient suffered no ill effects. The hospital conducted a thorough review and made several recommendations including one recommendation to avoid routine transfusions at night.

Problems with identification wristbands

In 15 cases identification wristbands were missing and in one case the wristband contained the wrong information (incorrect hospital number). Analysis of the circumstances of missing wristbands revealed that 7 cases (47%) related to outpatient transfusions, 5 of which were mis-identification incidents. This should be considered in the context that 11.1% of transfusions in the IBCT category were given in the outpatient setting. Of these incidents, 2 resulted in major ABO incompatibility and 3 were ABO compatible. In the other cases (5 on the ward and one each in ICU, A+E and theatre) which involved mis-identification, 2 resulted in major ABO incompatibility, one RhD incompatibility and 4 were ABO compatible. In 3 other cases (failure to irradiate, transfusion of outdated blood) the missing wristband was an incidental finding.

Case studies 10 and 11: The dangers of outpatient transfusions

Case study 10: Two patients being transfused in an outpatient setting shared the same drip stand. The lines became entangled and a unit of red cells intended for one patient ended up being transfused to

the other patient. Fortunately the unit was ABO /Rh compatible. Hospital policy for checking of transfusions was not followed.
Case study 11: A patient requiring outpatient transfusion received the wrong ABO compatible unit. The circumstances leading up to this mis-transfusion included placing the case notes on an empty bed in anticipation of the patient's arrival and asking the patient to confirm identification details with a yes/no answer rather than requesting the patient to recite name and date of birth. Again, hospital policies were not followed.
In neither of theses cases was the patient wearing an identification wristband.

Inappropriate component selected by clinician

5 cases fell into this category and 4 involved confusion about the use of emergency un-crossmatched group O red cells. The fifth case involved the transfusion of incompatible FFP. All 5 occurred in the setting of emergency transfusions. The first 4 cases can be summarised as follows:

- The mistaken use of group O negative blood cross-matched for another patient because the emergency O negative blood could not be found
- The use of O positive red cells cross-matched for another patient in mistake for emergency O negative blood because both were stored in the same drawer of the refrigerator instead of in separate drawers.
- The use of "flying squad" O negative blood for an obstetric emergency patient with known anti c.
- The use of emergency O positive instead of O negative red cells for a group O negative obstetric emergency.

Incidents of incorrect serological reasoning resulting in the transfusion of incompatible plasma have been previously mentioned.

Other procedural failures

This comprised a miscellaneous group not easily classifiable elsewhere in this section and included the following incidents:

- Over-transfusion of a neonate at a rate of 50 ml hourly for four hours (i.e. a total of 200 ml given) instead of 50 ml over four hours.
- Drip put up on the wrong identical twin and subsequently the wrong twin transfused.
- Failure to act on and subsequent deactivation of a satellite refrigerator alarm (previously mentioned)
- Overruling of protocol with respect to incorrectly labelled blood packs (previously mentioned)

Errors originating at the supplying blood centre

Eight of these were reported this year and comprised the following:

- One grouping error: group $A_{weak}B$ typed as group B
- Two failures to supply appropriate component (irradiated, leucodepleted)
- One incorrect red cell serology result reported to hospital
- Four "out of specification" (with respect to storage conditions or date) components supplied

Outcome

Of 136 fully analysed reports there were 35 cases of major ABO incompatibility, including one case which was also RhD incompatible, 21 cases of Rh incompatibility (20 RhD and one Rh c) and 12 cases where other red cell incompatible transfusions were given. 28 "wrong blood" incidents were ABO/Rh compatible.

The remaining cases were inappropriate transfusions with respect to special requirements for irradiation, CMV negativity or leucodepletion (n=22), wrong component transfused (n=2), other breaches of protocol (n=11) and inappropriate administration of anti D immunoglobulin (n=5).

- One patient died as a result of major ABO incompatibility
- The deaths of two patients were possibly related to the transfusion
- Ten patients died from unrelated causes
- Five patients recovered from intravascular haemolysis
- Seven RhD negative females of child-bearing potential were exposed to RhD positive red cells
- 108 patients suffered no lasting ill effects although a few manifested acute transfusion reactions

Table 12 summarises the above outcome information.

Table 12
Outcome of cases of incorrect blood component transfused (n=136)

Category	Survived/ no ill effects	Major morbidity	Died/ unrelated	Died/ possibly related	Died/ definitely related	Unknown	Total
ABO/Rh incompatible	24	4[1]	3	2	1	1	35
Rh incompatible	13	7[2]	1				21
ABO/Rh [3] compatible	27		1				28
Other red cell incompatibility	8	1[1]	2			1	12
Inappropriate transfusion							
Special requirements not met[4]	22						22
Wrong component	1		1				2
Other[5]	8		2			1	11
Anti D immunoglobulin	5						5
Total	**108**	**12**	**10**	**2**	**1**	**3**	**136**

1 Recovered from intravascular haemolysis
2 Potential RhD sensitisation in females of child-bearing potential
3 Includes 3 cases of procedural failure but "right blood to right patient"
4 CMV negative/irradiation/leucodepleted
5 Out of date/ inappropriate storage/over-transfusion

Procedural Review

All reporters were asked to state whether the incident had been reported to their Hospital Transfusion Committees.

Table 13
Hospital Transfusion Committees

Number of Responses	Response

9	No response
79	Not yet, but will be discussed at a future meeting
17	No Transfusion Committee exists at time of reporting
26	Yes
***131**	

* There were an additional 5 incidents for which no procedural review data was available:
1 incident involved a Blood Centre error which was reported by the centre itself
4 incidents were reported by letter rather than questionnaire

Reporters were also asked whether any changes had been made to policies / procedures as a result of the incident. 78 replied that changes had been made and 3 said that that the issue was "under discussion" at the time of reporting. 14 reporters stated that the error(s) resulted from a failure to follow existing adequate procedures. In these cases 11 recommended reiteration of current policy to all staff involved and 3 said that the individual members of staff concerned had been counselled or disciplined. In one incident the error was discovered some considerable time after the event and the source of the error could not then be identified. 34 reporters did not respond at all to the question of procedural change.

Recommended changes

Of the 78 respondents who stated that changes had been made the replies fell into the following categories:

- Changes implemented to documentation; collecting; handling; laboratory techniques/procedures; ward procedures/protocols; administration (n = 45)
- Implementation of new / additional training (n = 11)
- Review of existing policies / procedures / protocols (n = 18)
- Review of training requirements (n = 2)
- Recommendation to appoint new / additional staff (n = 1)
- Upgrade or renewal of equipment (n = 3)
- Dissemination of information (n = 6)
- Consideration given to introduction of innovative techniques / procedures (n = 7)

Overall there is evidence that hospitals are striving hard to improve the quality of transfusion practice and that serious incidents are investigated promptly and thoroughly with appropriate action being taken to guard against a recurrence.

COMMENTARY

- For the third year running the most important single cause contributing to mis-transfusion was failure of some aspect of the bedside checking procedure immediately prior to administering the transfusion. Causes included remote checking at the nurses' station or treatment room rather than at the bedside, checking the component against the accompanying paperwork not the patient and failure to note discrepancies between compatibility and donation labels where preceding laboratory labelling errors had occurred. There was some evidence to suggest that interruption during this critical step may have played a significant part in failure of the process.

- The absence of patient identification wristbands or alternative formal means of identification was noted on 15 occasions, 47% of which were related to outpatient transfusions. These omissions contributed to "wrong blood" incidents.

- The withdrawal of the wrong pack from its storage location in the hospital continues to be a common error and in this report was always followed by mis-identification at the bedside.

- The historical transfusion record was not checked or there was failure to act on relevant information in 22 instances. Such errors usually occurred in association with errors in other parts of the transfusion chain.

- Laboratory incidents included 25 errors of grouping, antibody screening and cross-matching, 5 cases where samples were transposed and 9 labelling errors. 50% of laboratory errors occurred "out of hours" but there is insufficient data to ascertain the significance of this finding.

- There were 15 cases of failure to request the appropriate component, most commonly irradiated components for patients being treated with purine analogues (fludarabine), neonates with a history of intra-uterine transfusion and patients with Hodgkin's disease. Failure at this point was often combined with inadequacies in the hospital blood bank record system.

- There were several incidents of the selection, issue and transfusion of incompatible plasma, as a result of incorrect serological reasoning, and 2 cases where cryoprecipitate was transfused in mistake for cryo-poor FFP in one case and paediatric FFP in the other case.

- Several problems arose in relation to the management of satellite storage refrigerators. These included failure to clear stocks of blood previously cross-matched for individual patients, failure to act on and subsequent deliberate deactivation of an alarm and confusion over the storage and use of emergency stocks of group O red cells. Each incident lead to the administration of inappropriate components and included one case of intravascular haemolysis.

- Confusion over telephone messages appeared to be a factor in some errors.

- Although there were only 2 cases of samples being taken from the wrong patient these errors were solely responsible for wrong blood transfusions and occurred in "classic" settings: confusion between two unknown accident victims and a mix-up over maternal and infant samples. In the latter case pre-labelled tubes were used.

RECOMMENDATIONS

"Wrong blood" incidents are without exception avoidable errors and it cannot be over-emphasised that the bedside check is the final, vital step in preventing mis-transfusion.

- **Every hospital must have a formal policy for the bedside check which must be rigidly enforced on all occasions.**

The procedure must ensure that components can be allocated to the correct patient and that previous laboratory labelling errors can be detected. Hospitals must ensure that staff undertaking this important task receive correct training.

- **The environment in which the transfusion is conducted must provide adequate working space, and allow staff responsible for the bedside check to carry out an uninterrupted checking procedure.**

Further investigation of the timing of transfusion errors may identify weak areas in the transfusion process, particularly out of hours, and enable steps to be taken to minimise the number of "out-of hours" transfusions.

- **Hospital systems must ensure that there are no exceptions with regard to the provision of patient identity wristbands or their equivalent**.

This is particularly important in the outpatient setting where familiarity with the patient may lead to a tendency to cut corners in the formal checking procedure.

- **Computerised identification systems are available to ensure safe transfusion at the bedside. These systems must now be evaluated.**

- **Hospitals must ensure that standards are set for minimum formal identification requirements and that staff responsible for this stage are aware of the key role which they play and are properly trained in the procedure.**

The correct collection of blood components from the hospital storage location is an essential intermediate step in the transfusion process. Mistakes at this point set the scene for subsequent errors resulting in wrong blood incidents.

- **The historical transfusion record must be available, consulted and acted upon at all times.**

It is an essential tool in ensuring the safety of the transfusion process. Access to information about previous grouping and special requirements may prevent a mis-transfusion.

- **Blood banks must continue to be vigilant in reviewing procedures, systems and training to prevent sample handling and technical errors**.

Despite increasing automation and computerisation in hospital laboratories transfusion testing remains an area where skill as well as training to established procedures are of paramount importance.

- **Individuals responsible for the prescription and request of blood components must be familiar with the special requirements of their patients. These requirements must be flagged on the patient's clinical and laboratory records.**

- **Staff prescribing and/or handling blood components must be educated with respect to their recognition and correct use.**

- **Hospitals must develop unambiguous protocols for the management of satellite refrigerators and their stocks**.

- **Telephoned requests for blood components must be formally recorded and incorporate all relevant information including special requirements.**
- **Staff responsible for taking samples for transfusion testing must at all times follow strict procedures to avoid confusion between patients at the time of sampling. Sample tubes must never be pre-labelled and labelling must be completed for one patient before moving on to the next. Special care is required when dealing with "unknown" multiple casualties**

- ***Advice on many of the above areas can be found in the recently published BCSH guideline "The administration of blood and blood components and the management of transfused patients"[5]. This guideline has been reproduced in Appendix 8.***