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 intended requirements.

This category produced the highest number of reports ($^{81}/_{169}$, 47%). Most episodes involved administration of a blood unit intended for another patient, usually involving a series of mistakes and inadequate adherence to prevailing hospital documented policies and guidelines. In other instances, components with 'special' characteristics was not provided as intended.

81 reports of an incorrect component being transfused were received. Of the 81, 63 questionnaires have been returned.

The data collated from all the returned questionnaires are presented in Appendix 5.i. This chapter aims to highlight common sites of error.

Sex	
Males	23
Females	38
Unknown	2

Age (see Chapter 6 for overview).	
Age range	3 months - 90 years
Median age	64 years

Components implicated	No. of cases
Red cells	52
Platelets	6
Fresh frozen plasma	4
Citrate phosphate dextrose adenine (CPDA) anticoagulant solution administered in error.	1

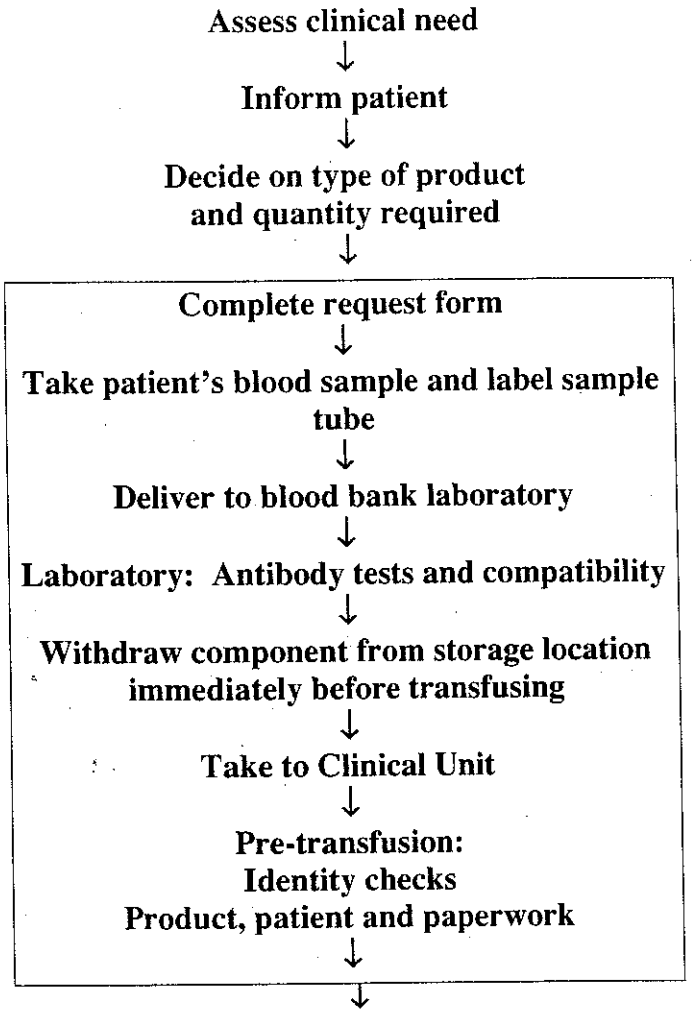
Errors in the clinical transfusion process.

There are many steps in the apparently simple process of requesting, matching, delivering and transfusing blood components. The correct outcome is summed up in a simple slogan:

' Right Blood, Right Patient, Right Time'

A mistake in any of the steps (or its omissions) increases the chance of an incorrect transfusion. Most "wrong blood" incidents result from the combined effect of several errors. Figure 8 illustrates the complexity of the process at hospital level.

Figure 8
Transfusion of Blood Components
Right blood/right patient/right time - essential steps



[Modified from Handbook of Transfusion Medicine, p32, 2nd Edition HMSO, 1996]

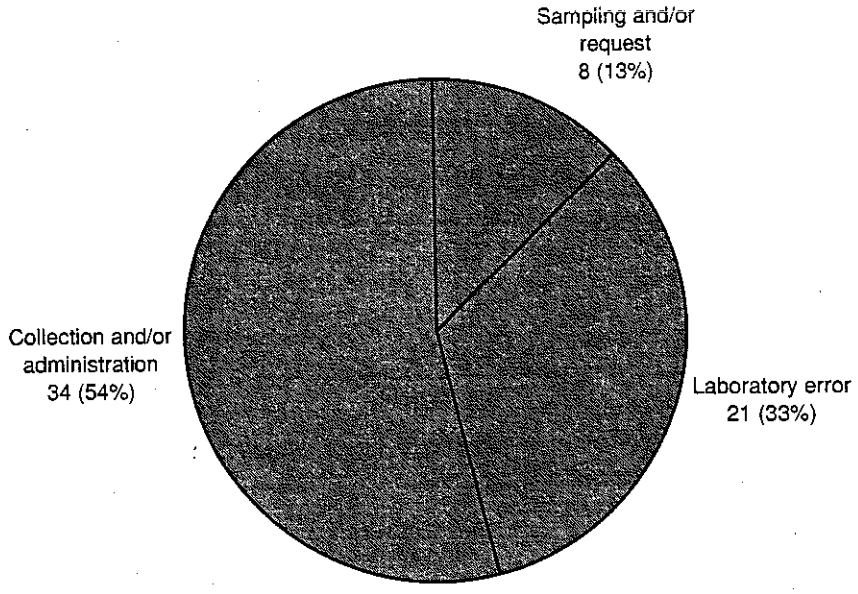
Analysis of reported errors

Where was the error reported to occur?

Errors fell into 3 categories:

1. Requesting blood and/or sampling the patient (8)
2. Laboratory errors - grouping, cross-matching or labelling (21)
3. Collection of blood from storage site (usually blood bank) and administration (34).
   The majority of the errors (54%) were attributed to the wrong unit being withdrawn from a blood bank refrigerator to take to the clinical unit, or in the bedside pre-transfusion checks.

Figure 9 Distribution of errors as stated by the reporting clinician (n=63)

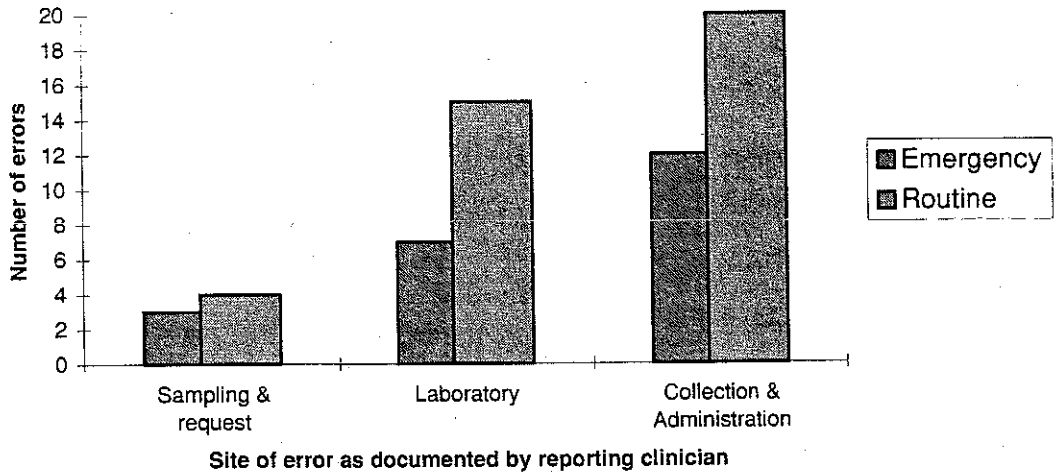


The questionnaire, completed for 63 incidents, sought further information about the circumstances and the factors that may have contributed to these mistakes and adverse outcomes. The findings are presented in some detail as they may help those responsible for training staff or for the review and implementation of transfusion procedures to identify and correct weak points in procedures.

Circumstances - emergency or routine, and site of reported error

Of the 63 complete reports, 39 errors related to routine, non-emergency requests, 22 to emergency requests, and in two this information was not reported.

Figure 10. Incidence of emergency and routine errors in the requesting, laboratory and administration steps of the process.*

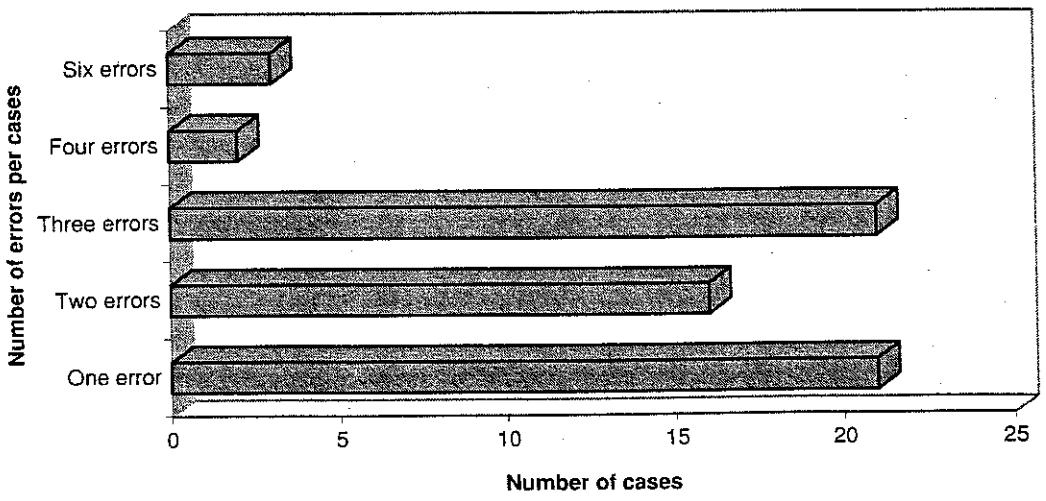


*In 2 cases the priority was not stated

Multiple errors contribute to many "wrong blood" incidents

Clinicians reported the mistake that had been recognised as the cause of the incorrect transfusion. However, analysis of the completed questionnaires showed that this mistake had been preceded by 1 to 5 other errors in the majority (42/63) of incidents. As shown in Figure 11, in the 63 incidents, a total of 142 procedural failures or omissions were identified.

Figure 11 Number of errors per case (n=63)



A sequence of multiple procedural failures or omissions usually precedes transfusion of the incorrect blood component. An accident waiting to happen...

Table 6 shows the site of the initial procedural failure that was identified from analysis of the reports. This gives a sense of the way in which mistakes in the early stages of the process may create the circumstances in which the blood component arriving at the patient's bedside may become 'an accident waiting to happen'. In the 63 incidents, there were 11 errors in blood sampling and request forms, 18 blood bank laboratory errors, and notably, 23 occasions in which the blood was not correctly checked at the final point of withdrawal from storage immediately before setting up the transfusion.

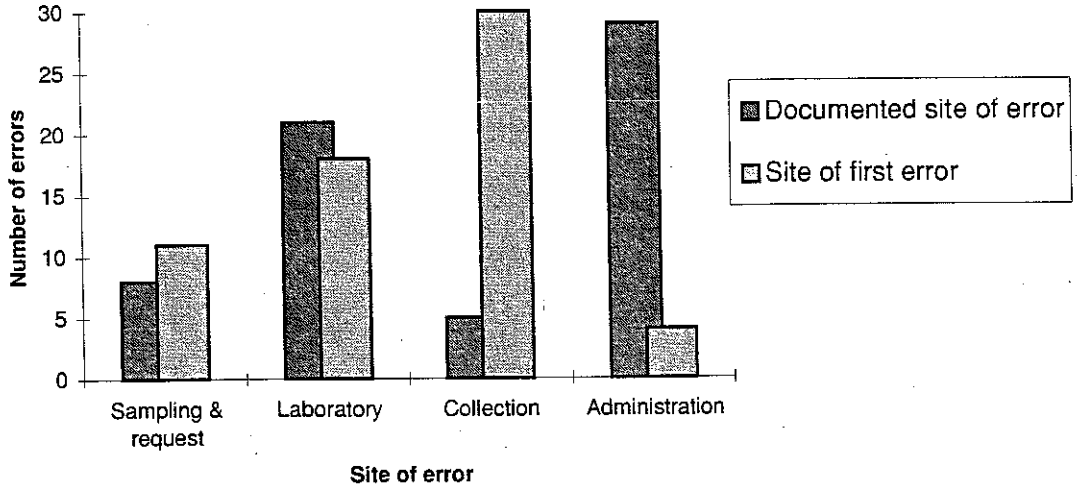
Table 6 Site of first error (n=63)

LOCATION	NUMBER OF ERRORS
PATIENT SAMPLING AND REQUEST	
Taken from incorrect patient	2
Details on sample incorrect	1
Details on request form incorrect	8
Total	11
BLOOD BANK LABORATORY	
Historical group not checked	1
Blood incorrectly grouped	7
Blood incorrectly crossmatched	2
Component incorrectly labelled	2
Inappropriate component selected	6
Total	18
COLLECTION OF COMPONENT	
Formal check for identity with patient omitted	23
Incorrect component collected	7
Total	30
ADMINISTRATION OF PRODUCT	
Component not formally checked against patient at bedside	4

This build up of errors is shown graphically in Fig 12.

Figure 12 Site of first error (n=63)
This figure shows the site of error which was recognised by the clinical team, documented and reported to SHOT by the reporting clinician. However, this clearly illustrates the way in which antecedent errors culminate in the transfusion of an incorrect blood component. For example:

- The 34 reported errors at the point of transfusion were preceded by 28 errors in withdrawing blood from its storage site prior to transfusion
- 3 of the laboratory errors were preceded by a sample/request error, 2 of which were telephone requests.



Commentary and recommendations

The following analysis of 63 complete reports of wrong transfusions demonstrates a situation common to complex, multi-step processes which involve many different individuals and which cross professional and managerial boundaries. Delivery of a reliable outcome constitutes a conventional total quality management challenge, with the goal of ensuring that each person involved 'get it right, first time, every time'.

Errors in requesting and cross-match sampling

Transposition of samples at the bedside

There were 2 cases of transposition of compatibility samples at the patient's bedside. One incident, which resulted in a fatality, involved the use of pre-labelled tubes. The second report did not state if pre-labelled tubes were used.

The request and supply of special blood components

There were 5 reports in which the correct component was not requested and/or issued. Three incidents involved the transfusion of non-irradiated components where irradiation was required, and the other 2 cases were where CMV negative components were appropriate but untested components provided. All of these errors occurred when the patient was temporarily away from the specialist unit, or the on-call facility for issue and supply of a requested product took place at a hospital remote from the specialist unit.

Telephone requests

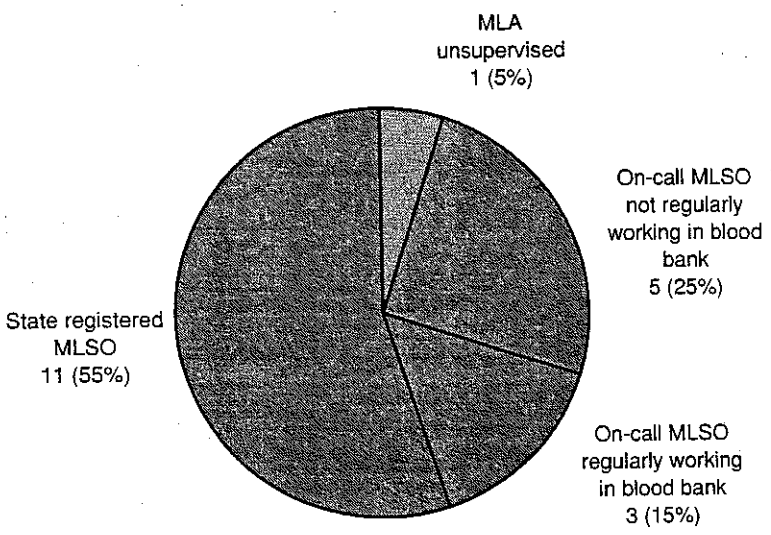
Inadequate information given to the laboratory via telephone requests led to 2 cases of an incorrect component transfused.

Blood Bank Laboratory

Laboratory staff

Laboratory errors were not restricted to either inexperienced staff or on call situations. Of the 21 laboratory errors reported (Figure 13), 12 incidents occurred during routine working hours. Eleven of these involved an experienced blood bank state registered MLSO and 1 an unsupervised MLA. Eight incidents occurred on-call, of which 3 involved regular blood bank staff, and the remaining 5 staff not regularly working in the blood bank.

Figure 13 Grade of laboratory staff and time of error (n=20)*



*In 1 report this was not stated.

Table 7 details the grade of staff, type of error, and whether the incident occurred during routine or on-call hours.

Table 7 Documented laboratory errors (n=21)*

Notes	Error	Total number of errors	State registered MLSO, routine hours, regularly working in blood bank	State registered MLSO, on-call, regularly working in blood bank	State registered MLSO, on-call, not regularly working in blood bank	MLA, Unsupervised routine hours
1	Blood incorrectly grouped	11	7	1	3	
2	Blood incorrectly cross-matched	2		1	1	
3	Component incorrectly labelled	3	1	1		1
4	Inappropriate component selected	5	3	1		

*In 1 case the grade of staff was not stated.

NOTES

1. Incorrect group (n=11)

- 3 errors were due to transposition of samples in the laboratory.
- 1 error was due to the incorrect sample being used to group and crossmatch. This involved a telephone request where only the patient's name was given.
- 1 error occurred due to the omission of the group procedure. The crossmatch was recorded as compatible.
- 2 incidents were due to splash contamination of microplates used for ABO determination.
- 4 cases, where no specific reason for the error was reported, in which
  Rh positive patient grouped as A Rh positive (1 case)
  A Rh negative patient grouped as A Rh positive (1 case)
  Rh negative patient grouped as O Rh positive, (2 cases).

2. Incorrect crossmatch (n=2)

- In the 2 cases that were incorrectly crossmatched, no reason for the error was reported.

3. Incorrectly labelled (n=3)

- 1 case involved a telephone request where only the patients name was given. Due to an incorrect assumption by the member of staff who took the call, the wrong date of birth was entered into the laboratory computer, resulting in misidentification of the patient.
- An incompatible unit was inadvertently labelled with a compatibility label.
- The computer generated compatibility label was attached to an incorrect blood bag.

4. Incorrect selection of component (n=5)

- 1 case involved a group AB Rh positive patient being issued B Rh positive fresh frozen plasma due to incorrect serological reasoning
- 1 case was due to A Rh positive red cells being issued for an A Rh negative female patient of child bearing age.
- 1 case was where a gamma irradiated product was requested but a non-irradiated component supplied
- 2 cases were where autologous blood previously donated by the patient was held in the blood bank, but the laboratory issued compatible donor red cells.

Historical blood bank records not checked

There were 7 cases involving patients who had been grouped previously and whose historical blood bank records were not checked prior to component issue.

In 2 of these cases an ABO incompatible transfusion could have been avoided if current guidelines had been followed[6]. One patient died from sequelae of the transfusion, and the other suffered the complications of intravascular haemolysis.

In 1 incident the historical records of a patient could not be checked at night because computer records were not accessible to the on-call laboratory staff.

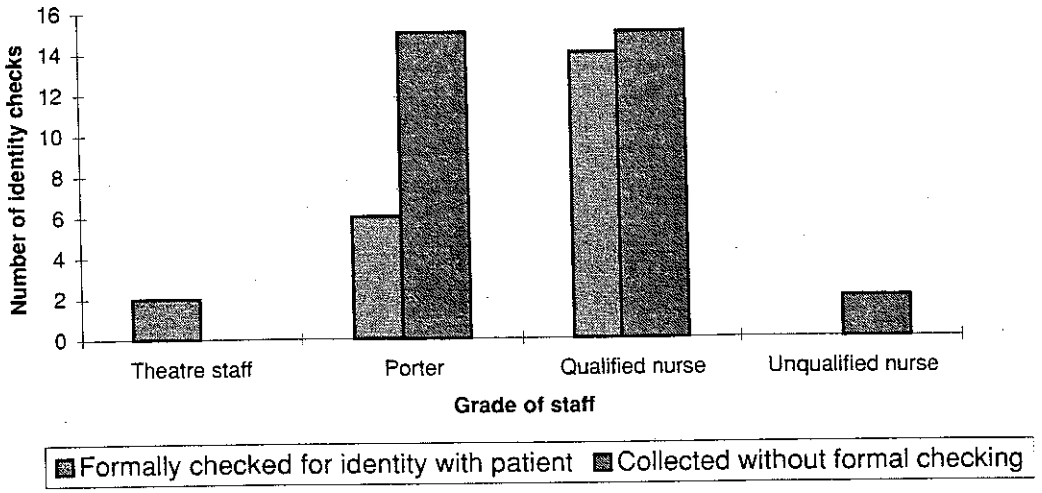
Errors in withdrawal of blood components from storage location immediately prior to transfusion.

Withdrawal of the component from the storage location was a major source of primary error, with 63 reported incidents.

In 14 cases the component was handed over personally from blood bank staff to a porter or member of the clinical unit staff. In 28 cases the component was collected from a blood bank refrigerator and in 19 from a satellite refrigerator. There were 2 cases where the site of collection was not stated.

In 34 incidents the component was not checked at the time of withdrawal for identity with the patient. Of these 34 cases, 19 resulted in the collection of an incorrect component. In these cases it appeared that the grade of staff checking the component did not influence whether a formal check was carried out (Figure 14).

Figure 14. Formal identity check versus grade of staff (n=54) excluding 9 cases where either the grade of staff or the identity check was not stated.



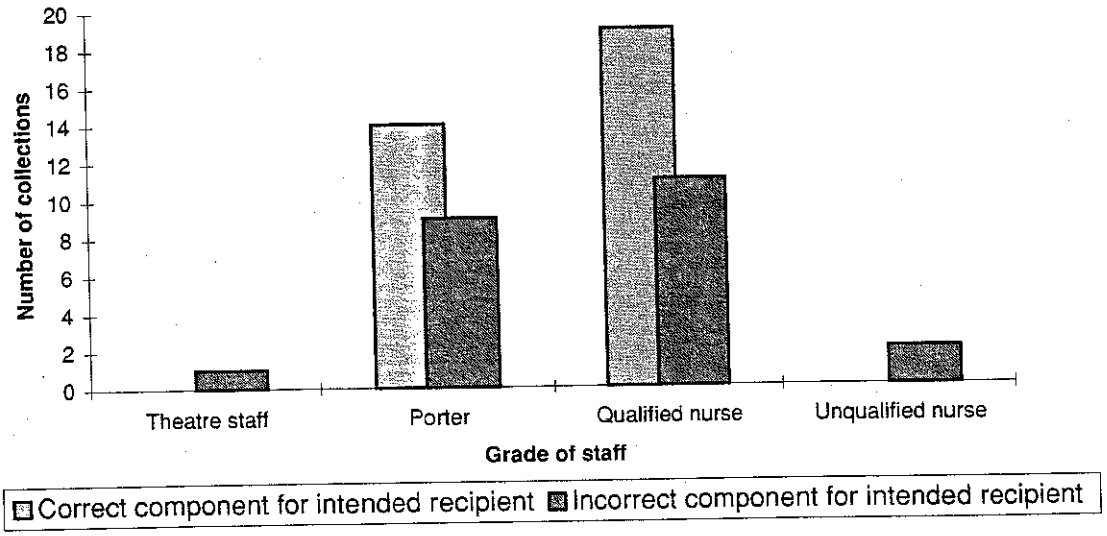
However, even when a formal identity check had been carried out, collection of an incorrect component occurred on 6 occasions (Table 8).

Table 8 Formal check of component at the time of collection versus correct component collected (n=63).
In 7 cases, the data were incomplete.

	Formal check of component	
	Yes	No
Correct component	16	15
Incorrect component	6	19

The incorrect component was collected in 27 cases, including 2 where the presence of a formal check was not stated. In 20 cases the component was incorrect with respect to name, date of birth and hospital number; in 3 cases it was incorrect with respect to date of birth and hospital number; in 1 case it was incorrect with respect to date of birth only. Again it appeared that the grade of staff collecting the component did not influence the reliability of the process (Figure 15).

Figure 15 Withdrawal of correct and incorrect component from storage site: grades of staff involved (n=27)*



*excludes 3 cases which involved the inappropriate collection of components from emergency stock.

NB These figures do not include incorrect components issued where the labelling has been correct for the intended recipient, but due to an error in the laboratory may not in fact be a compatible product for the intended recipient.

Transfusion of blood components - 'bedside' procedures.

There were 34 reported cases where the final bedside check had been omitted. In most of these, two people were reported to have been involved in setting up and checking the transfusion. Table 9 shows the grade of staff setting up the transfusion in these cases.

Table 9 Grades of staff involved in setting up transfusions in which the bedside check was incomplete (n=28)*

Grade of staff	Number of cases
2 Doctors	1
Doctor and qualified nurse	3
Theatre nurse & unknown	1
Qualified nurse & unknown	2
Qualified nurse & qualified nurse	19
Qualified nurse & unqualified nurse	2

* excludes 6 cases where the grade of staff was not reported.

Use of identity wristbands

In 8 incidents where an incorrect component was transfused, the patient had no identity wristband. Three cases occurred in outpatients, 3 on the ward, 1 in theatre and 1 on a day unit.

Recognition of error

Of the 63 incorrect component transfused errors

- 4 were identitfied due to an acute transfusion reaction. Three of these were ABO incompatible transfusions (2 red cells, 1 FFP) and 1 ABO and Rh incompatible (red cells).
- 2 were identified due to a delayed haemolytic transfusion reaction. Both were ABO incompatible transfusions
- 28 incidences were detected by the laboratory staff
- 2 cases were discovered by junior doctors.
- 1 case was identified by theatre staff
- 1 case was identified by a porter
- 25 incidents were discovered on the ward.

Where transfusion of the incorrect component was not associated with a reaction the error was detected in a variety of ways, for example:

- A trainee doctor in theatre documenting the components transfused retrospectively, noted the discrepancy between the identity of the patient and the red cells transfused.

- Ward staff who were responsible for the intended recipient telephoned the blood bank to inquire when the platelets they had requested would be available. The blood bank had already issued the platelets and traced the error through the portering service to another ward.

- Laboratory staff went to replace the emergency O negative red cells and discovered they were still there, another patient's O negative red cells having been used in mistake for the emergency supply.

Outcome

Out of the 63 cases fully reported, there were 15 ABO incompatible transfusions, 5 Rh incompatible transfusions and 1 ABO+Rh incompatible transfusion (Tables 10 and 11).

- 1 patient died from sequelae of the transfusion. This was an O positive patient who received a whole unit of A positive red cells, and required both intensive care and dialysis.
- 4 patients recovered from the effects of intravascular haemolysis. Three of these were ABO incompatible transfusions and 1 an ABO and Rh incompatible transfusion.
- 1 patient survived with renal impairment. This patient was seriously ill with multiple medical problems at the time of transfusion.
- 1 patient was already on ITU, but suffered with complications of coagulopathy as a direct result of the transfusion.
- Of the 5 documented Rh incompatible transfusions, 4 recipients were female and 1 was male. Three of the females were <50 years of age, including a 2 year old infant.
- In 6 cases the blood group of the patient and/or the incompatible component was not stated, although 1 case was clearly an incompatible transfusion as the recipient required admission to an intensive care unit with haemoglobinuria, hypotension and loin pain after receiving only 50 - 100 mls of incorrect red cells. This patient was documented as having recovered from the effects of intravascular haemolysis.

Table 10 Sequelae of incorrect component transfused according to whether there was ABO and/or Rhesus incompatibility (n=57)*

Sequelae	Asymptomatic	Minor reaction	Major morbidity	Death
ABO incompatible	6	3	5	1
Rh incompatible	2	0	3	0
ABO + Rh Incompatible	0	0	1	0
ABO + Rh compatible	36	0	0	0

*excludes 6 unknowns where the blood group was not stated.

Major morbidity was classified as:
- Intensive care admission and/or ventilation
- Dialysis and/or renal dysfunction
- Risk of Rhesus sensitisation in a female of child-bearing age (or child)

Minor reaction: classified where the patient had suffered symptoms/complications attributed to the transfusion but these did not require ITU admission or dialysis, and the patient recovered rapidly.

Asymptomatic: classified where no symptoms were directly attributed to the transfusion.
Death due to the underlying condition or from other causes are included in this category (n=5)

Table 11 Sequelae of ABO and/or Rhesus incompatible blood transfusions (n=21).
These comprise 1 Rh & ABO incompatible transfusion, 15 ABO incompatible transfusions and 5 Rh incompatible transfusions.

Patient ABO & Rh group	IBT ABO & Rh group	Blood component	Volume IBT Trans-fused	Symptoms/ Complications	ITU ventilation and/or dialysis	Outcome
O neg	A pos	red cells	>100 mls	renal failure bronchospasm fever	no	recovered from complications of intravascular haemolysis
AB pos	B pos	fresh frozen plasma	9 units	loin pain falling Hb increase in urea and creatinine	no	recovered from complications of intravascular haemolysis
O pos	A neg	red cells	28 units	rigors	ITU admission	recovered from complications of intravascular haemolysis
O pos	A pos	red cells	1 unit	renal failure haematological disorder	ITU admission dialysis	died from sequelae of transfusion
O pos	A pos	red cells leucocyte depleted	1 unit	anaesthetised	already on ITU	recovered from complications of intravascular haemolysis
O pos	A pos	red cells	50-100 mls	bronchspasm hypotension fever	no	survived with no ill effects
B pos	A pos	fresh frozen plasma	1 unit	none	no	survived with no ill effects
O neg	A neg	red cells	1 unit	marked jaundice	no	survived with no ill effects
A pos	AB pos	red cells	3 units	none	no	survived with no ill effects
A pos	AB pos	red cells	5 units	anaemia jaundice spherocytes (9 days later)	no	survived with no ill effects
A pos	AB pos	red cells	>100mls	none	no	survived with no ill effects
A pos	O pos	fresh frozen plasma	>100mls	coagulopathy	already on ITU	survived with no ill effects
A pos	B pos	red cells	<50 mls	ventilatory problems progression of underlying condition	ITU admission	survived with no ill effects
O pos	A pos	red cells	>100mls	none	no	survived with no ill effects
O pos	A pos	red cells	50-100 mls	none	no	survived with no ill effects
O pos	B pos	red cells	2 units	none	no	survived with no ill effects
A neg	A pos	red cells	2 units	possible Rh sensitisation	already on ITU	survived with no ill effects
A neg	A pos	platelets - apheresis	1 unit	possible Rh sensitisation	none	survived with no ill effects
A neg	A pos	red cells	>100mls	possible Rh sensitisation	already on ITU	survived with no ill effects
O pos neg	O pos	red cells FEMALE	<50mls > 50	possible Rh sensitisation	no	survived with no ill effects
O neg	O pos	red cells MALE	<50mls	none	no	survived with no ill effects

Procedural review

Of the 94 hospitals who submitted reports, 18 did not have a transfusion committee or other established forum where the incident could be reviewed. Of the 18, 3 haematology departments were reviewing their local transfusion procedures, 7 had made changes in consultation with the other disciplines involved and 8 had not addressed the situation.

Five hospitals reported that the transfusion committee felt that adequate guidelines were in place, and a change to transfusion policy was not required, although staff education should be implemented.

In 6 of 34 hospitals where the bedside check had been inadequate, the use of identity wristbands had been adopted. In a further case the transfusion policy was under review and in the remaining cases no changes have occurred.

In 34 cases, a review by the transfusion committee was pending at the time of reporting, although in most cases a procedural change had already been introduced where a problem had been identified.

Summary of findings

1. The use of pre-labelled sampling tubes led to one fatality.

2. Request errors were noted, 5 involved the request and supply of 'special components', 2 were telephone requests where inadequate information was given.

3. The historical transfusion record was not always checked prior to component issue.

4. Errors in grouping, crossmatching, labelling and selection of a component have been documented.

5. The most important single contributing cause of incorrect transfusions was the withdrawal of the wrong pack from its storage location (either the hospital blood bank or another storage location).

6. Lack of patient hospital identity wristbands or other formal means of identification led to an incorrect component being transfused on 8 occasions.

7. Two thirds of incorrect component transfused incidents involved multiple errors, culminating in administration of the incorrect unit. The local procedures for the final bedside checks intended to ensure that patients receive the correct blood were frequently not performed, or if performed failed to detect that an incorrect pack had been delivered. This was not prevented by the involvement of staff in the checking procedure.

8. In 1 reported case a component was given to a patient for whom blood transfusion had not been prescribed at all.

Recommendations

1. Pre-labelled sampling tubes should not be used[6].

2. Request systems for blood and components should ensure prescription, issue and administration of the correct component. These should cover 'special requirements' and telephone requests, and should clarify the respective responsibilities of medical and blood bank staff[6].

3. Access to previous transfusion records in the laboratory containing grouping information should be available at all times and used as appropriate [6].

4. Blood banks should review procedures and systems including enforcement of the current guidelines and standards available[6], in addition to training to prevent errors of sample handling and technical errors.

5. Hospitals should review their current system to ensure that errors in this area can be prevented. Standards should be set for a minimal formal identification requirement when a component is collected. Novel identification systems are available, but have resource implications. These systems merit evaluation and development.

6. Hospital systems should ensure that in-patients and out-patients can be identified at the time of both sampling and transfusion, specifically in out-patient departments where patient identity is often not available.

7. The bedside check is vital in preventing transfusion error, staff should be vigilant in checking identification details of the component against those of the patient. Every hospital should have a policy for formally checking the blood component at the bedside. This is currently being addressed by the British Committee for Standards and Haematology (BCSH) on behalf of the British Society for Haematology (BSH).

8. Blood components should always be administered against a written prescription.