4 Incorrect Blood Component Transfused

Definition

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.

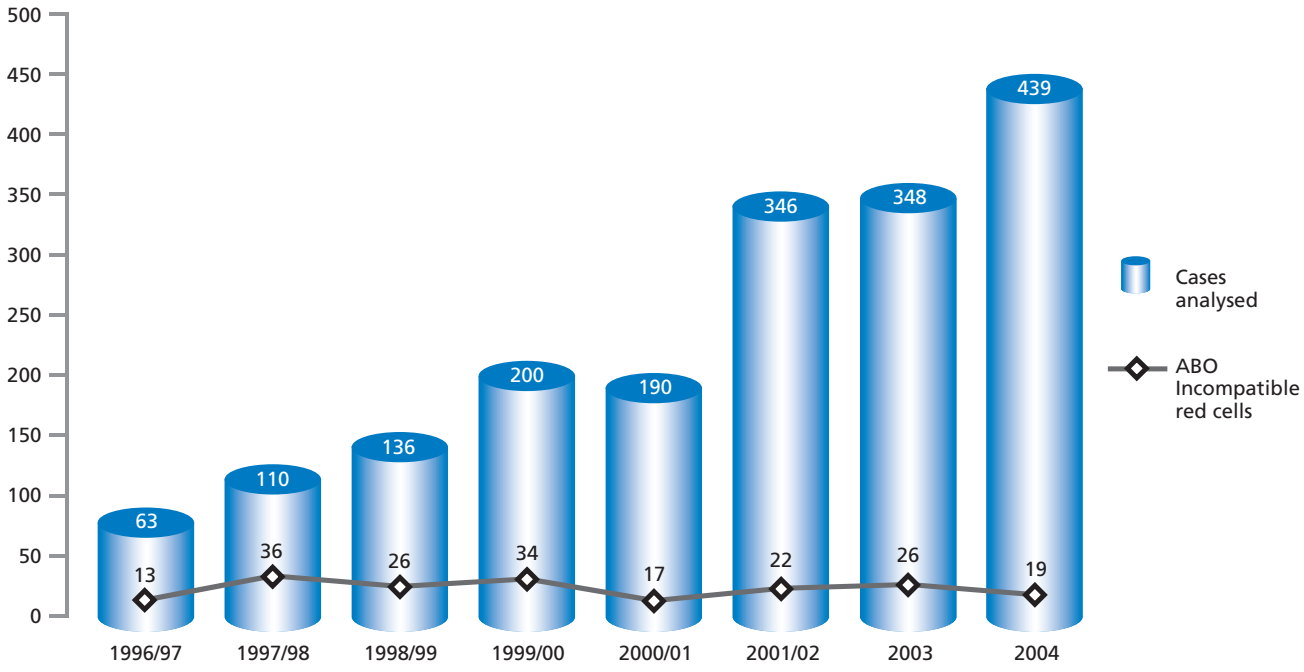
460 completed questionnaires were received.

Twenty-one reports were withdrawn by the analysts, of which 11 were "right blood to right patient" incidents, in which the patient received the intended component despite a serious breach of protocol. These are analysed separately at the end of this section. A further 10 did not meet the criteria for IBCT.

This section describes the findings from 439 analysed cases, a 26% increase from 2003. Reports of IBCT show no sign of reaching a plateau, and it is likely that the appointment of Transfusion Practitioners and establishment of Hospital Transfusion Teams is resulting in increased awareness of errors and improved reporting. Last year we noted an encouraging downward trend in reports of ABO incompatible transfusions in the context of an increase in total reports, - this year sees a continuation of this trend.

Figure 4

ABO incompatible red cell transfusions



Patients

185 males and 254 females.

Ages ranged from 1 day to 98 years.

57 reports (13%) related to patients under 18 years of whom 31 (7%) were infants under 12 months.

Mortality and morbidity

ABO incompatibility

Two patients died following ABO incompatible red cell transfusions, one considered likely (imputability 2) and one possibly (imputability 1) to be due to the transfusion.

Five patients suffered haemolytic transfusion reactions with major morbidity due to ABO incompatibility - red cells in 4 cases and FFP in one. One of these patients (see case 3 below) died from hypostatic pneumonia 6 weeks later, having been immobilised because surgery for a fracture was delayed as a result of the transfusion reaction.

One recipient of an ABO mismatched bone marrow transplant received platelets of their historic group (O) instead of donor group (A) after marrow engraftment, resulting in a haemolytic reaction.

A further 2 patients had mild haemolytic reactions following ABO incompatible red cell transfusions.

Eleven patients received ABO incompatible red cells but suffered no morbidity.

Inappropriate transfusion

Two patients died following inappropriate transfusions given in one case on the basis of a haemoglobin result from a sample from the wrong patient (case 5 below) and in another (case 6) following an incorrect haemoglobin result from a dilute sample. Death was thought to be definitely related to transfusion in the first case (imputability 3) and possibly related in the second (imputability 1).

An infant undergoing cardiac surgery developed severe bradycardia and hypotension following over-rapid platelet transfusion.

Intra-uterine transfusion of blood with too high a haematocrit (wrongly labelled by the blood centre) caused fetal distress in one case.

Other morbidity

There were 2 acute and 2 delayed haemolytic reactions reported due to irregular antibodies not identified in pre-transfusion testing. (anti-K and unknown antibody causing ATRs, anti-Jk^a and anti-Jk^b causing Delayed Transfusion Reactions (DTRs)) These cases are further discussed under 'Failure to provide for special requirements' and 'Other pre-transfusion testing errors' below.

Analysis of reported errors

The IBCT questionnaire requests much detail regarding the circumstances of events and adverse outcomes and this information is used to analyse each case individually and draw conclusions regarding the distribution and types of errors. This section seeks to highlight and illustrate some of the important issues identified from reported incidents.

Types of event and causes

'Wrong blood' events (n=88)

These patients, who received a blood component intended for a different patient or of an incorrect group, represent those at high risk of a potentially life-threatening haemolytic transfusion reaction. Nineteen patients received ABO incompatible red cell transfusions, 4 of which were also D incompatible. Two patients received ABO incompatible FFP and two ABO incompatible platelets.

Patient mis-identification (n=46)

It is notable that 16 of these cases involved patients being treated in critical care situations (ICUs, high dependency units, accident & emergency (A&E) departments and operating theatres).

There were 6 cases in which the sample for pre-transfusion testing was taken from the wrong patient or labelled with another patient's details (wrong blood in tube), and because the patient was not previously known to the laboratory, the error could not be detected.

Case 1

Shirley Bloggs was being seen in the A&E department by a Specialist Registrar (SpR) from the gynaecology ward. He was asked by the A&E Senior House Officer (SHO) to see Lara Croft, and he took Mrs Bloggs' notes with him. The A&E SHO took a sample for crossmatch from Lara Croft, but labelled it with Shirley Bloggs' details taken from the notes by the bedside. The sample was sent urgently to the laboratory, who crossmatched and issued blood for Shirley Bloggs using the sample from Lara Croft, who was group A. Meanwhile the gynae SpR returned to Shirley Bloggs, took a sample for crossmatch, labelled it (correctly) and wrote up the blood prescription. This sample was sent to the laboratory in the routine delivery, - when it arrived and was tested the error was discovered, but by this time Shirley Bloggs, who was group O, had received 4 units of group A blood. She developed acute intravascular haemolysis with renal failure and was admitted to ICU for exchange transfusion, but recovered.

In 40 cases there were errors in blood collection and administration to the patient. In 23 of these the wrong component was collected from the refrigerator and the error was not detected at the bedside, in 17 the blood was correctly delivered to the ward but was given to the wrong patient.

A common feature of these cases, documented in 17 of the 40 reports, is that the blood was 'checked' away from the patient's bedside against a compatibility form, and no wristband or other identity check was carried out. The patient details on the compatibility form will always match those on the blood pack and checking one against the other does not constitute an identity check.

Case 2

Two patients on a haemato-oncology unit were to be transfused. They had similar names (Ron Biggs and Reg Biggins). Reg Biggins' blood was ready for collection and was transferred by an auxiliary nurse to a satellite refrigerator. The blood for Ron Biggs was not yet ready.

An agency nurse was sent to collect blood for Ron. She took no documentation, went to the satellite refrigerator and took a unit of the blood intended for Reg. She then collected Ron's prescription sheet from his bedside and went to the ward office where she and a colleague checked the unit of blood against the compatibility form (as the form was issued with the blood, the details on it matched those on the blood pack). The unit of blood was transfused to Ron without further bedside check. It was fortunately ABO compatible.

Case 3

A porter was sent to the blood bank to collect a unit of blood for Fred Bloggs, whose blood group was AB D negative. He collected the correct unit but delivered it to the wrong ward, where Jane Smith, who was Group O D positive, was being transfused. On seeing the unit of blood, the staff nurse assumed that it was the second unit for Jane Smith. The staff nurse and deputy ward sister checked the unit of blood against the compatibility form away from the patient's bedside and transfused it without a bedside id check. Later that evening the ward where Fred Bloggs was being treated phoned the lab to say that the blood had not arrived. It was not traced until the next morning when the transfusion practitioner found the empty pack. The ward had noticed that Jane Smith had become jaundiced but did not associate this with the transfusion. She developed acute renal failure requiring dialysis from which she recovered, but her planned surgery for a hip fracture was postponed for 4 weeks during which she was immobile. Post-operatively she developed hypostatic pneumonia from which she died.

Other reported cases include; five further examples of blood given to the wrong patient with the same or a similar name, a patient on a renal unit who was not wearing a wristband, an unidentified male admitted to A&E whose blood sample and request form were labelled with a unique id, but blood for a different unidentified male was collected from the refrigerator and transfused, a unit of blood checked against a cardex on the end of the patient's bed but which belonged to a different patient, and two patients in adjacent beds in a haematology day unit who received one another's blood.

Blood delivered by blood service transport direct to clinical areas (n=2)

In a further 2 cases blood was delivered by blood service transport direct to a clinical area in emergency situations and transfused without further checking.

Learning points

- The final identity check when taking a blood sample or administering blood MUST be done at the patient's bedside against a wristband or equivalent form of identification. No other form of checking is acceptable under any circumstances
- The final patient identity check at the bedside must never be omitted, however urgent the clinical situation
- Mistakes can happen even in areas where there is 'one-to-one' care

Wrong ABO group determination (n=18)

Eighteen cases were reported in which there was an error in ABO group determination by a hospital transfusion laboratory. In 5 of these the wrong sample was selected for testing; in 12 the correct sample was tested using a manual method and the result was wrongly interpreted or wrongly recorded. In one worrying case, the BMS took a deliberate shortcut by omitting to perform an ABO group on the current sample, relying instead on a historic group from 3 years previously, which was unfortunately wrong. Six of these 18 patients received ABO incompatible transfusions, one died and one suffered major morbidity.

Laboratory selection and labelling errors (n=22)

In a further 22 cases a wrong blood component was selected by the laboratory, or was mis-labelled. These included 4 cases where compatibility labels were transposed, one resulting in an ABO incompatible transfusion. Five cases involved selection of FFP of a different ABO group from the patient, raising concerns about possible lack of understanding of ABO compatibility of plasma. In 7 cases D positive blood was inadvertently selected for D negative patients.

Learning points

- Manual methods of ABO group determination are not robust and are particularly unsafe in urgent situations
- BCSH guidelines for pre-transfusion testing should be adhered to
- A table of FFP compatibility should be included in laboratory procedures for components

Failure to provide components of appropriate specification or that did not meet special requirements (n=143)

These cases, which in 2004 comprised 33% of IBCT reports, are summarised in Table 2.

Table 2

Special requirements not met

Special requirement	No of cases
Irradiated component	84
CMV negative component	10
Irradiated and CMV negative	4
Viral inactivated or non-UK FFP for child	9
Antigen negative red cells for pt with known antibody	20
ABO or D mismatched BMT recipient	7
Red cells for IUT, exchange transfusion, neonate	7
HLA matched platelets	1
Pre-deposited autologous red cells	1

As in previous reports, the majority of these cases involved failure to provide irradiated blood components for patients treated with purine analogues or who have undergone stem cell transplantation. Errors and failures of communication in 'special requirements not met' reports occurred at all stages in the transfusion chain. Contributory factors included shared care, out-patient prescribing of purine analogues not notified to the laboratory, provision of incomplete or incorrect patient details such that the transfusion history was not available, inadequate clinical information on request forms, lack of familiarity of special requirements for neonates.

Eighty-four patients (c.f. 81 last year) were put at risk of TA-GvHD by failure to provide irradiated components. Most cases arose from failure of communication between the clinical team and the blood transfusion laboratory, especially where patients were treated in more than one centre.

Seven reports were received of patients who had received ABO or D mismatched bone marrow transplants and were given blood of their historic group instead of the donor group.

In 4 cases, blood unsuitable for neonatal use was given as a matter of expediency in an emergency.

One patient had pre-deposited blood for elective surgery, but when blood was requested out of hours, there was no system in place to alert the laboratory that autologous blood was available.

Three patients suffered adverse reactions as a result of special requirements not being met; one recipient of an ABO mismatched bone marrow transplant (BMT) was given platelets of their historic group (O) after engraftment and suffered a haemolytic reaction; one fetus was transfused with blood of too high a haematocrit (wrongly labelled by the blood centre) and developed signs of distress, one patient with a previously known but currently undetectable anti-Jk^a who did not receive antigen negative blood had a mild delayed transfusion reaction.

Learning points

- Discrepant ABO grouping results must be fully investigated and resolved, taking into account relevant clinical information, before blood is issued
- Consideration should be given to the introduction of a patient held booklet (similar to the anticoagulant booklet) with details of protocols following BMT and other special requirements
- Laboratory IT systems should be updated with new rules when special requirements are introduced (e.g. methylene blue (MB) FFP for patients under 16) and used to flag special requirements

Other pre-transfusion testing errors - incorrect D groups, missed alloantibodies and missed incompatibilities (n=29)

Six cases of incorrect D group determination were reported. One was due to a reagent problem whilst the remaining 5 were related to emergency or out of hours testing. In 4 of these a manual technique was used.

Twenty-three cases were reported in which laboratories failed to identify an irregular antibody or red cell incompatibility in pre-transfusion testing. Three of these involved reference laboratories.

Three patients suffered mild haemolytic reactions. In one patient the antibody screen was positive but identification was not attempted, as this was not required by laboratory policy when testing was done out of hours. Anti-K was identified in the pre-transfusion sample when retrospective testing was carried out following the ATR. In the second case the BMS failed to notice a positive antibody screen and issued blood electronically. The antibody specificity was not recorded. The third case was due to anti-Jk^b - see case 4 below.

Case 4

A positive antibody screen was noted in a patient with a known anti-K. The BMS did not perform an identification panel, but issued K-negative crossmatch compatible blood. The patient developed a haemolytic transfusion reaction, investigation showed an anti-Jk^b detectable in the pre-transfusion sample. Procedures in the laboratory have since been modified and now state that an antibody identification must be carried out on every occasion in patients with known antibodies, consistent with guidelines.

In 5 cases a positive antibody screen was missed - in 1 an on-call BMS failed to read DiaMed cards which were found in the centrifuge the next day.

In a further 5 the antibody screen was found to be positive but the BMS did not attempt identification as this was laboratory policy out of hours and at weekends.

Two cases involved inadequate testing before issuing blood for an infant.

In 9/23 cases testing was done out of hours or at a weekend. It is of concern that there are different standards of testing in some laboratories depending on whether samples are tested during or outside of 'core hours'.

Two cases were reported in which blood was issued electronically without a serological crossmatch despite a positive antibody screen and no antibody identification.

Learning points

- The same standards should apply to pre-transfusion testing in and outside of laboratory 'core hours'
- Laboratory procedures should be consistent with current guidelines
- Maternal results must always be checked before issuing blood for a neonate
- Recommended best practice (included in forthcoming BCSH guideline on Specification and Use of IT Systems in Blood Transfusion Practice) is that all electronic issue procedures should be controlled by computer algorithms to validate appropriateness of actions

Inappropriate transfusions (n=56)

Table 3

Cause of inappropriate transfusion	Number
FBC sample unsuitable (e.g. from 'drip arm') or from wrong patient	19
Analytical error in haematology laboratory	11
FBC result wrongly transcribed on ward	4
Wrong component given*	6
Transfusion given before haematology results available, on basis of out of date result, or in contravention of instructions	10
Blood components available 'on standby' and given without prescription	3
Wrong dose given (e.g. request for '4 units' of platelets - 4 ATDs issues)	2
Excessively rapid transfusion of platelets to an infant undergoing cardiac surgery	1

*In 1 case, 2 qualified nurses on a surgical ward gave red cells when platelets were prescribed

Case 5

A request for full blood count (FBC) was left on a ward for a phlebotomist. A blood sample was sent to the laboratory, where a Hb of 7.9g/dl was recorded and telephoned to the ward. The haematology laboratory suggested that a repeat sample was required because of the change from the previously recorded level on this patient. No repeat was sent, instead a 3 unit transfusion was prescribed and given. The post-transfusion Hb was 18.7 g/dl. Blood grouping of the pre-and post-transfusion samples revealed that the pre-transfusion sample was from a different patient. The patient was venesected but developed cardiac failure and subsequently died.

Case 6

A frail elderly lady was admitted with a chest infection, dehydration and impaired renal function. Her Hb was within the normal range. Two days later a further sample was taken and the Hb was found to be 7.7g/dl. The result was sent to the ward computer without comment. The biochemistry laboratory realised that the sample was diluted with saline and rejected the results obtained. The sample had been taken from the 'drip arm'.

A 2 unit transfusion was prescribed and given, following which the Hb was 18.0g/dl. Her creatinine increased to 251umol/l. Her renal function continued to deteriorate and she died 5 days later.

Learning points

- Correct procedures must be followed for patient sampling
- A decision to transfuse must be based on clinical assessment as well as laboratory results - look at the patient!
- Blood components must not be given without prescription
- Blood should only be prescribed by a doctor who has undergone training in blood transfusion and has been assessed as competent
- Diagnostic laboratories must carry out checks to identify large changes in parameters ('delta checks') and should not issue unvalidated reports
- Nurses giving blood must be familiar with blood components and the indications for their use

'Unsafe' transfusions (n=54)

Fifty-four patients received potentially 'unsafe' transfusions, including damaged packs (2), units past their expiry (27), or that had been out of temperature control (19). A further 6 were outwith guidelines on sampling intervals for pre-transfusion testing.

Learning points

- Named individuals should be given responsibility for checking of satellite refrigerators and for removal of expired units
- 'Emergency O D negative' blood should be rotated back into main stock before it nears expiry

Adverse events relating to anti-D immunoglobulin (Ig) (n=67)

Sixty-seven events were related to anti-D administration and are summarised in table 4 below.

Table 4

Type of event	Number
Late administration of anti-D Ig	16
Anti-D Ig given to D pos patient	15
Anti-D Ig given to patient with immune anti-D	11
Anti-D Ig given to patient with weak D antigen	10
Anti-D Ig given on basis of incorrect cord group	5
Other	10

There was evidence of lack of understanding by both midwives and laboratory staff of the significance of immune anti-D.

'Right blood to right patient' (n=86)

Eighty-six cases were received (11 re-classified from IBCT) which described episodes where the right component was given to the right patient despite one or more errors in the checking process. These cases do not fit the existing SHOT reporting categories and are, therefore, not included in the total number of incidents received. They do, however, provide some important evidence indicating that serious errors continue to be made which, in these cases, were fortuitously not harmful to the patient.

The 86 cases are summarised in table 5. These identification elements were missing from, or contained errors on, a wide variety of documentation (for example sample tubes, patient notes, wristbands etc.) Similarly the errors were made in different locations (e.g. A&E, hospital blood bank etc.)

Table 5

Right Blood to Right Patient episodes

Elements which were wrong	Number of incidents
Date of birth	27
Spelling of name	19
Hospital number	17
Date of birth and Hospital number	6
Incorrect Surname	4
Date of birth and address	2
Transposed donation numbers	2
Spelling of name and wrong date of birth	2
A&E number	1
Date of birth, address, and first name	1
Date of birth, hospital number and first name	1
First name	1
Gender	1
NHS number	1
Missing documentation	1

Learning points

- Correct patient identification is crucial in preventing 'wrong blood' incidents. Every patient must have an id wristband or equivalent containing their surname, first name, date of birth and unique id number. For unidentified patients there must be a policy in place stating the minimum identification data set
- All staff should receive training and demonstrate competency in positive identification procedures

COMMENTARY

Notable findings this year were

- Patient mis-identification continues to cause 'wrong blood' events, with approximately one-third of such reports relating to critical care.
- Inappropriate transfusion is a potential cause of death and serious morbidity. In many cases there was inadequate clinical assessment of the patient.
- There has been an increase in reports of failure to provide for special transfusion requirements. This may in part be due to increased awareness of the problem, and increased numbers of patients at risk, and must be addressed.
- Laboratory errors are a cause for concern and in some cases reflect poor standards of practice.
- The reduction in ABO incompatible transfusions is encouraging. (Figure 4)

RECOMMENDATIONS

- Training and competency testing of all staff involved in the transfusion process must emphasise the importance of positive patient identification, with particular attention paid to critical care situations.

  Action: HTCs

- All newly qualified doctors must receive education in blood transfusion as recommended by the CMO for England. A web-based education package (http://www.learnbloodtransfusion.org) is included in the FY1 curriculum in Scotland and should be implemented throughout the UK.

  Action: CMO's NBTC, PMETB

- Pending the availability of an effective IT solution, hospitals should take steps to implement robust methods to ensure that the patient's transfusion history including special requirements is kept up to date and accessible to the transfusion laboratory at all times. A patient held booklet is one possible solution.

  Action: CMO's NBTC, RTC/HTC network

- The EU Directive requires that hospital transfusion laboratories implement a quality system. Elements of this include ensuring adequate staffing levels, systematic and documented training, validation of methods and change control. This presents an opportunity to drive improvements in practice and must be fully supported, resourced and monitored.

  Action: Trust CEOs