9 Incorrect Blood Component Transfused (IBCT) (clinical and laboratory errors) n=278

Authors: Julie Ball, Hema Mistry, Peter Baker, Paula Bolton-Maggs

The category of incorrect blood component transfused is divided into instances where a wrong component was transfused (WCT) and those where the specific requirements were not met (SRNM).

Definitions:

Wrong component transfused (WCT):

Where a patient was transfused with a blood component of an incorrect blood group, or which was intended for another patient and was incompatible with the recipient, which was intended for another recipient but happened to be compatible with the recipient, or which was other than that prescribed e.g. platelets instead of red cells.

Specific requirements not met (SRNM):

Where a patient was transfused with a blood component that did not meet their specific transfusion requirements, for example irradiated components, human leucocyte antigen (HLA)-matched platelets when indicated; antigen-negative red cell units for a patient with known antibodies, red cells of extended phenotype for a patient with a specific clinical condition (e.g. haemoglobinopathy), or a component with neonatal specification where indicated. (This does not include cases where a clinical decision was taken to knowingly transfuse components not meeting the specification in view of clinical urgency).

Key SHOT messages

WCT: ABO-incompatible red cell transfusions:

- In 2014 there were 10 ABO-incompatible red cell transfusions all caused by clinical errors in both collection and administration, or administration alone. These numbers exclude ABO errors in haemopoietic stem cell transplants (HSCT). Eight recipients were group O, and 6 of these received group A units. One experienced major morbidity and there were no deaths. These indicate that staff are not following procedure and are putting patient lives at risk

WCT: Overall:

- Patient identification failure as a result of incomplete checking was the root cause in 17/40 clinical wrong component transfusions. This is a fundamental element in the transfusion process and the point at which a wrong transfusion can be prevented (BCSH Harris et al. 2009)
- Component selection errors in the laboratory may be due to lack of understanding, knowledge and skills by laboratory staff, but correct storage can prevent the wrong component being selected by laboratory staff e.g. cryoprecipitate stored in the incorrect drawer and mistakenly issued as fresh frozen plasma (FFP)

SRNM:

- Failures to communicate the patient's specific requirements continue to be the leading cause of patients not receiving components of the correct specification for them
- The relevant British Committee for Standards in Haematology (BCSH) guidelines (e.g. BCSH Treleaven et al. 2011, BCSH Gibson et al. 2004) are clear regarding specific requirements for blood transfusion. It can be particularly difficult when the patient is treated in an area where staff may not be familiar with the patient groups who may have specific requirements. Transfusion is a small part of medical and nursing practice accordingly, clear communication in handover and in the case notes is essential to alert colleagues to the patient's needs

Analysis of multiple errors:

- Many IBCT incidents demonstrate multiple errors in the process (median number of errors 3). The individual steps in the transfusion process incorporate independent checks at each stage which are designed to confirm the details and so should detect earlier errors (BCSH Harris et al. 2009)
- The pre-administration bedside check is a fundamental step as it is the final opportunity to detect an error earlier in the process and prevent a wrong transfusion. In 2014 162/265 (61.1%) of cases analysed could have been detected at this point

Summary data

A total of 278 reports were received where patients received an incorrect blood component.

In 202/278 (72.7%) patients received units where the specific requirements were not met (Table 9.1). Patient ages ranged from birth to 101 years (median 61).

Twenty nine cases were reported in children:

- 12 laboratory errors, 4 WCT and 8 SRNM
- 17 clinical errors, 8 WCT of which one was a haemopoietic stem cell transplant (HSCT) and 9 SRNM

For further information about paediatric and transplant cases please see Chapter 20 Paediatric Cases and Chapter 22 Summary of Incidents Related to Transplant Cases.

Table 9.1: An overview of incorrect blood components transfused n=278

Type of event	Clinical	Laboratory
Wrong blood	**18**	**14**
ABO-incompatible red cells*	*10*	*0*
D-mismatched red cells	*0*	*8*
Compatible red cell groups but not intended for that patient	*8*	*6*
Others	**14**	**15**
ABO identical platelets**	*0*	*1*
D-mismatched platelets transfused	*0*	*3*
Wrong component type transfused (compatible)	*11*	*7*
ABO non-identical fresh frozen plasma (FFP)	*1*	*3*
Least incompatible red cells selected following serological crossmatch	*0*	*1*
Patient with atypical red cell antibodies received incompatible emergency O D-negative red cells; the component was intended for another patient	*1*	*0*
Mother's crossmatched red cells given to neonate at delivery	*1*	*0*
Wrong group selected for HSCT/solid organ transplant patients	**8**	**7**
Wrong ABO group	*7*	*4*
Wrong D group	*1*	*3*
Specific requirements not met	**116**	**86**
Total	**156**	**122**

** In one case the red cells were also D mismatched*

*** in this case 2 platelet packs were issued to 2 different patients but were labelled and issued the wrong way round*

Deaths n=0

There were no deaths reported as a result of an incorrect blood component being transfused.

Major morbidity n=4 (3 laboratory and 1 clinical case)

One of the 10 patients who received an ABO-incompatible red cell transfusion suffered major morbidity, Case 1. In 3 other cases laboratory errors resulted in K-sensitisation in women of childbearing potential.

Case 1: Component collection and administration error leads to ABO-incompatible transfusion requiring haemodialysis

Red cell units were taken in advance to the operating theatre and placed in one of the blood refrigerators. A member of staff went to the blood refrigerator without patient identifiers to collect units for the patient (group O) in theatre. The incorrect unit was collected without formal checking and the two staff administering the red cells (group A) did not do any checks at the patient's side prior to administration. The error was only realised at the end of the surgery. The patient required haemodialysis.

Potential for major morbidity n=7

There were 7 cases due to laboratory errors.

- In 4 instances D-positive red cells were transfused to D-negative women of childbearing potential (mixture of testing and component selection errors)
- In 3 cases K-positive units were transfused to women of childbearing potential (all component selection errors)

Case 2: A biomedical scientist (BMS) overrides warning flag while rushing during a late shift

A group B D-negative female neonate (premature 24/40) was transfused 10.5mL of O D-positive red cells. This error was detected 9 days after the transfusion. The laboratory information management system (LIMS) showed a warning flag during the component issue but this was overridden by the BMS working a late shift when they were rushing to complete the work. Also the component label was not checked when attaching it to the red cell pack. Other errors occurred during the collection from the refrigerator and the final bedside administration check, a total of 4 errors.

Learning point

- There should always be staff of sufficient competence to perform the workload in the transfusion laboratory. The UK Transfusion Laboratory Collaborative Standards (2014) clearly outline staffing, information technology and knowledge and skill requirements of transfusion laboratories (Chaffe et al. 2014)

ABO-incompatible red cell transfusions n=10

(All clinical errors)

There were 10 ABO-incompatible red cell transfusions (Table 9.2). One of these was also a D mismatch. In 3 cases the error was discovered when the patient experienced a mild-moderate reaction but in one case a more serious reaction occurred with renal failure requiring dialysis (Case 1 above).

Note:The EU requires reporting of 'immunological haemolysis due to ABO incompatibility' however, those cases where an ABO-incompatible transfusion has taken place without evidence of haemolysis are currently not reportable (which are 66% of all cases as illustrated in the Annual SHOT Report for last year). There was evidence of haemolysis in only 4/10 cases.

Error	Patient group	Group of red cell unit
Collection and administration	O+	A+
Collection and administration	O+	A+
Collection and administration	O+	A+
Collection and administration	A+	B+
Collection and administration	O+	A+
Administration	O+	B-
Administration	O+	A+
Administration	O+	A+
Administration	B+	A+
Administration*	O-	AB+

**also D mismatch*

Table 9.2: ABO-incompatible red cell transfusions 2014 n=10

Case 3: Medical review following a transfusion reaction reveals transfusion was to the wrong patient

Two patients in adjacent beds required blood transfusions. A collection slip was completed and handed to the porter. Patient S (group O D-positive) was the intended recipient however; the collection slip was incorrectly completed with Patient W's details (group A D-positive).

The error was not detected at the bedside as nursing staff failed to complete bedside checks. Three minutes into the transfusion, the patient became breathless, the transfusion was stopped and the medical team called. The doctor noted that the blood unit was labelled with different patient details. Patient S had received 15mL of an ABO-incompatible transfusion (group A red cells transfused to a group O recipient). The patient was admitted to the high dependency unit (HDU) as a result of his co-morbidities but had no long term complications from the incident.

D mismatches n=11

There were 11 cases, all laboratory errors, (9 female, 1 male and 1 gender unknown) where D-mismatched components were erroneously transfused, (8 red cells and 3 platelets). Four of these 11 cases are described earlier as they had the potential for sensitisation in women of childbearing potential. In 4 cases the wrong D group was given to a male patient or females who were not of childbearing potential. An additional 3 transfusions occurred where the patient received platelets of the wrong D group due to a component selection error. There are occasions when there is a considered decision to transfuse non-identical components to patients, however in all these cases the transfusions were due to error. The risk of developing anti-D as a result of receiving D-positive platelets is much lower than for red cells. The platelet membrane does not express D and the risk is attributable to the accompanying red cells. A recent study of 485 D-negative recipients who had received D-positive platelets found that 7/485 (1.4%) developed anti-D (Cid et al. 2015).

Causes of error:

- Six testing errors (4 D grouping errors, 2 procedural errors)
- Five component selection errors

Case 4: Failure to correctly determine D status of patient leads to transfusion of several group O D-positive red cell units

In 2011 a young woman was grouped as O weak D but the result was edited on the LIMS as O D-positive. The sample was not sent to the Blood Service for further investigation. She presented again in February 2014 and again grouped as O weak D and was transfused 3 units of O D-positive red cells. She was admitted to another hospital in October 2014 and was grouped as O weak D, and this time the sample was referred to the Blood Service who reported a D variant (DAR). The patient should therefore be regarded as D-negative for transfusion purposes. She did not develop anti-D.

Learning point

- The standard operating procedures (SOP) should be clear and prescriptive in the process for determination of the D type of a patient with clear information about which D group to transfuse, aligned to national guidelines and recommendations (BCSH Milkins et al. 2013)

Wrong component type transfused n=18

In 18 cases an incorrect component type was requested, issued or administered to the patient. In 7/18 cases the error originated in the laboratory; 4/7 of these could have been detected by the final bedside administration checks.

It is surprising that staff who should have been trained and competency-assessed for participation in transfusion practice still do not recognise differences in component types despite their different appearances and storage locations.

Table 9.3: Laboratory causes of wrong component type transfused n=7

Urgency	Required	Issued then administered
Routine	Prothrombin complex concentrate (PCC)	Platelets
Routine	Patient X received HLA-matched platelets issued and labelled for patient Y	
Emergency* n=2	Group-specific red cells	O D-negative red cells
Routine	Transposition of labels (Pack 1 and Pack 2) for platelets from the same donation intended for 2 separate patients	
Routine	FFP	Cryoprecipitate
Urgent	FFP	Cryoprecipitate

** In these 2 cases the patient had atypical antibodies and the emergency O D-negative units of red cells were incompatible with the recipients*

Urgency	Required	Administered	Collected by	Administered by
Urgent	Neonatal emergency red cells	Adult emergency red cells	Unknown	Unknown
Emergency	Neonatal emergency red cells	Adult emergency red cells	Nurse	Unknown
Urgent	Red cells	Platelets	Unknown	2 nurses
Urgent	Platelets	Red cells	HCA	1 nurse
Urgent	Platelets	FFP	HCA	2 nurses
Urgent	Platelets	FFP	HCA	1 midwife & 1 nurse
Routine	Platelets	FFP	Porter	2 nurses
Routine	FFP	Red cells	HCA	2 nurses
Routine	FFP	Red cells	HCA	1 nurse
Routine	FFP	Red cells	Nurse	1 nurse
Emergency	**FFP	Platelets	N/A	1 nurse

Table 9.4: Clinical errors resulting in wrong component type transfused n=11

Nurse=registered nurse, HCA=health care assistant

Two of the cases (clinical errors) resulted in neonates receiving emergency adult red cells instead of the emergency units of neonatal specification. In one of the other cases in this group, FFP instead of platelets was transfused in an emergency and this component was part of a trauma pack**. The nurse administered FFP in error when platelets were prescribed. She proceeded to sign for the FFP against the platelet prescription.

ABO non-identical FFP transfusions n=4

There were 3 non-identical FFP transfusions resulting from 1 grouping error and 2 cases where the wrong component was selected, all were emergencies or urgent, (Case 5). In 1 further case, there was confusion when the doctor prescribed FFP for patient X but requested FFP for patient Y. The two nurses checked the prescription chart but did not check the compatibility tags on the unit of FFP resulting in patient X (group AB D-positive) receiving FFP issued and labelled for patient Y (group O D-positive).

Case 5: Issue of inappropriate group ABO FFP in an emergency

Following admission of a trauma patient with haemorrhagic shock the massive haemorrhage protocol was activated. Three units of group O FFP thawed for a previous patient were available. These 3 units were allocated and transfused to the trauma patient. The patient's correct group was A. This error was noticed during fating of the units. This work was performed out-of-hours by a BMS who did not normally work in the transfusion laboratory. The laboratory SOP was also not clear concerning the ABO compatibility requirements of FFP.

Learning point

- All members of staff working in a blood transfusion laboratory must actively and regularly participate in a programme of practical and knowledge-based competency. Staff who are not permanently established in blood transfusion should complete at least 10 days of supervised working with the transfusion laboratory (Chaffe et al. 2014)

Wrong group selected for HSCT/solid organ transplant patients n=15 (8 clinical and 7 laboratory errors)

In 8 clinical cases (7 ABO and 1 D) the main causes were poor communication between clinical and laboratory staff or poor communication between hospitals in shared cases. In addition, there were 7 cases where the laboratory issued the wrong/unsuitable group to HSCT patients (4 ABO and 3 D).

In 1 of these cases, a patient had the wrong group FFP selected following an incompatible organ transplant. These are discussed in Chapter 22 Summary of Incidents Related to Transplant Cases.

Near miss WCT cases n=795

Table 9.5: Near misses that could have led to IBCT n=795

Point in the process	Type of error made	Number of cases	Percentage of cases
Request	Request for incorrect patient	4	1.0%
	HSCT group error when requesting	3	
	Wrong component requested	1	
Sample taking	Wrong blood in tube (WBIT)*	684	86.0%
Sample receipt	Entered into incorrect patient record	13	1.8%
	Incorrect patient administration system (PAS)/ LIMS merge	1	
Testing	Misinterpretation	4	2.6%
	Incomplete testing prior to issue	2	
	Manual group error	4	
	Transcription	6	
	ABO testing error (cause unknown)	5	
Component selection	D-positive issued to D-negative patient	7	2.1%
	Incorrect component type	7	
	Wrong ABO group selected	3	
Component labelling	Transposition labels between patients	2	0.8%
	Component mislabelled	4	
Collection	Collection incorrect unit	33	4.4%
	Wrong details on collection slip	1	
	Wrong units sent to ward	1	
Administration	Attempted administration to the wrong patient	10	1.3%
Total		**795**	**100%**

** 2 other WBIT incidents could have led to avoidable transfusions and are included in Chapter 10 Avoidable, Delayed or Undertransfusion (ADU)*

WBIT potentially leading to IBCT n=684 (+2 ADU=686 WBITs in total)

Definition of WBIT incidents:

- Blood is taken from the wrong patient and is labelled with the intended patient's details
- Blood is taken from the intended patient, but labelled with another patient's details

For the second year (2013 and 2014) there were no reports of WBIT resulting in an incorrect transfusion, but the number of reported near miss WBITs remains high. This is a good illustration of the value of near miss reports as it indicates persistence of dangerous practice and continued need for improvement.

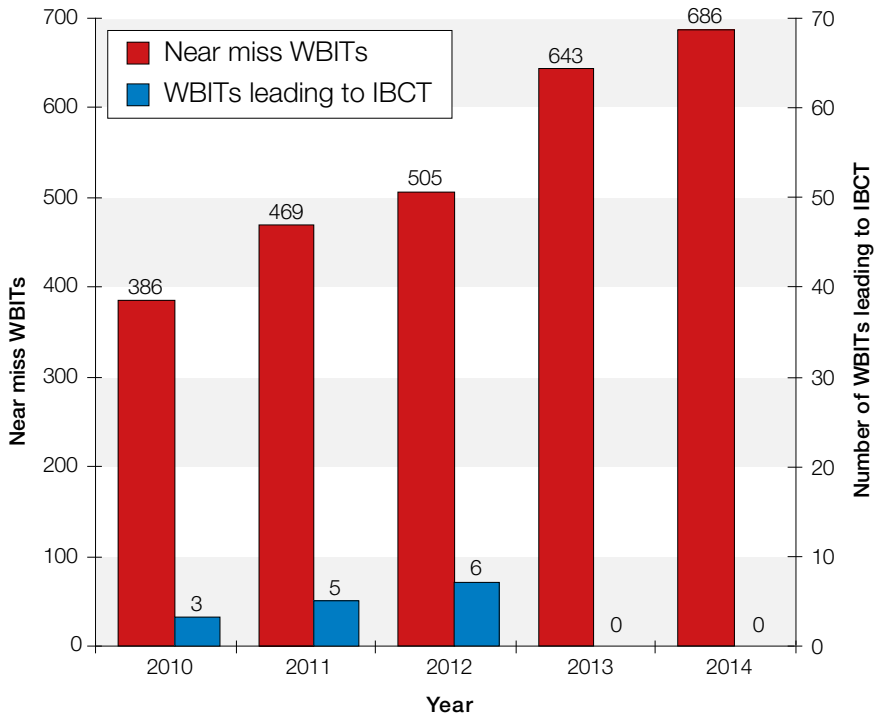


Figure 9.1: Cumulative comparison of total near miss WBIT reports and those leading to IBCT 2010-2014

Detection of WBIT incidents that could have led to IBCT n=684

Point in the process	How was WBIT error detected	Number of cases	Percentage of cases
Sample receipt	Sample taker realised error	63	15.8%
	Detected by laboratory vigilance	38	
	Alerted by a non-transfusion sample	7	
Testing	At authorisation of results	239	77.3%
	Unknown point during testing	238	
	Further sample differed	37	
	Alerted by a non-transfusion sample	15	
Administration	Other colleague realised error	25	6.6%
	Sample taker realised error	18	
	Pre-administration checks	2	
Other	Patient realised	2	0.3%
Total		**684**	**100%**

Table 9.6: Point in process where wrong blood in tube incident was detected

Laboratory processes are particularly important in detecting WBIT, but patient safety relies on quality processes and checks undertaken by all staff involved in transfusion, both laboratory and clinical. An improved safety measure was introduced in the 2012 BCSH guidelines for pre-transfusion compatibility procedures (BCSH Milkins et al. 2013) which recommends a group-check sample should be tested for all patients where there is no historical group and group O red cells should be used until a second confirmatory group is established. It may be advantageous to consider taking an initial grouping sample and second confirmatory sample from any patient who may require transfusion at some point.

Case 6: Undertaking a group-check sample may prevent patient harm

Five years previously, a patient had been bled for a number of tests as part of a pre-surgical assessment. That was the patient's first group and save and the result would have been used as the historical sample for future transfusion-related requests. A second sample at the time was haemolysed and therefore not processed, so no check group was done. During the intervening years the patient attended hospital for four more inpatient admissions and a group and antibody screen was not repeated at any time. On the fifth admission, five years after the original grouping sample, a second group and antibody screen sample was taken. The first sample had shown the group to be O D-positive, but the sample five years later was B D-positive. A repeat sample confirmed the patient was B D-positive. As well as the original wrong blood in tube grouping error, this patient was also cleared for the initial procedure with blood tests belonging to another person.

Further details of cases related to wrong blood in tube and an analysis of the group check sample policy are included in Chapter 7 Near Miss Reporting (NM).

Information technology (IT)-related IBCT-WCT cases n=22

There were 22 IBCT-WCT cases that also had an IT element and these are described below. The numbers are included in the tables above where appropriate, so these are not additional cases.

Use of warning flags or alerts n=15 and failure to consult the historical record n=1

There were 9 cases where a warning flag was in place but not heeded, 6 where the flag was not updated and 1 where the historical record was not consulted.

Ten of these 'wrong blood' incidents were in haemopoietic stem cell transplant patients and two in renal transplant patients. Wrong blood errors in transplant centres may arise because of the complexity of information stored on the LIMS. In some situations the LIMS did not appear to have the functionality to manage the changing requirements before, during and after a transplant. The key elements requiring some IT control include the ability to

- Flag the date of the haemopoietic stem cell or solid organ transplant
- Store the recipient and donor blood groups as well as the current blood group
- Support the issue of each blood component of the correct group

There were also errors related to poor communication between the clinical area and the laboratory either in terms of the timeliness of the information about the transplant or where care was shared between a transplant centre and a local hospital. Therefore the laboratory was unable to update warning flags.

Incorrect result entered manually n=4

All four cases had an anomalous D group that required investigation and had a wrong D type recorded on the LIMS. The cases highlight problems that can arise either with manual editing of the initial result or transcribing the red cell reference laboratory result incorrectly.

Online blood ordering system (OBOS) n=1

Case 7: Potential sensitisation to D due to a 'tick-box' error

OBOS was used to order emergency platelets for a woman of childbearing potential with gastrointestinal (GI) bleeding. The BMS ticked the wrong box and ordered A D-positive platelets but the patient was A D-negative. A different BMS issued the platelets as soon as they arrived and failed to notice the D mismatch. The woman received anti-D immunoglobulin to prevent sensitisation.

Electronic blood management systems n=1

Case 8: Wrong blood collected despite a visual and audible alarm

Blood was removed from an issue refrigerator using an electronic blood management system and the operator did not heed the alarm warning that the wrong blood was being collected. The blood was transfused to the wrong patient but was ABO compatible.

Specific requirements not met (SRNM)

Type of specific requirement	Number of laboratory cases	Number of clinical cases	Total
Irradiated units	14	102	**116**
Specific phenotype of red cells	41	4	**45**
Inappropriate use of electronic issue (EI)	11	0	**11**
K-negative units for females of childbearing potential	6	0	**6**
Pathogen-inactivated FFP or cryoprecipitate	6	0	**6**
Cytomegalovirus (CMV) negative units	1	4	**5**
Components issued based on 1 sample only and no confirmatory blood group check taken	4	0	**4**
HLA-matched platelets	1	1	**2**
Blood warmer required	0	3	**3**
Human platelet antigen (HPA)1a-matched platelets	1	1	**2**
Platelets in platelet additive solution	0	1	**1**
Washed red cells	1	0	**1**
Total	**86**	**116**	**202**

Table 9.7: Specific requirements not met n=202

The total number of incidents where specific requirements were not met that were reported in 2014 in the laboratory (86 reports) has increased compared with 2013 (56 reports).

The most commonly reported laboratory errors have increased compared to 2013. These are:

- Failure to provide specifically phenotyped (25 in 2013 compared with 41 in 2014)
- Failure to provide irradiated units (8 in 2013 compared with 14 in 2014)
- Inappropriate use of electronic issue (5 in 2013 compared with 11 in 2014)

The number of cases due to clinical errors has reduced from 134 (2013) to 116 (2014)

Failure to provide irradiated components n=116

This was the most common unmet specific requirement (116/202, 57.4%),

- 14/86 (16.3%) of laboratory reports
- 102/116 (87.9%) of clinical reports

These failures were usually in patients where the indications were either previous treatment with a purine analogue or a history of Hodgkin lymphoma (BCSH Treleaven et al. 2010).

Case 9: Wrong patient identification (ID) number and failure to check for multiple records results in non-irradiated components being supplied to a patient previously treated with fludarabine

A request form was received by the transfusion laboratory requesting blood for a patient the following day. No clinical details or specific requirements were noted on the form. The laboratory entered the request onto the LIMS but failed to check for previous records for this patient. Blood was crossmatched and subsequently transfused. However, the patient had a second record with a different hospital number which recorded the requirement for irradiated components due to previous treatment with fludarabine (purine analogue). This was not picked up by the transfusion laboratory or the staff on the day unit transfusing the blood.

This happened again when the same hospital number was used as on the original request. Both request forms had been completed by the same non-clinical member of staff who was not qualified to request blood. The crossmatches were performed on two sites by different people.

In the 14 laboratory cases:

- 6/14 cases the BMS failed to consult available patient historical records
- 6/14 the BMS missed information that was provided on the request form
- 2/14 patient demographics or LIMS flag was incorrectly transcribed

Inappropriate use of electronic issue n=11 of 86 laboratory cases

- 9/11 BMS failed to exclude these patients from electronic issue
- 2/11 the use of electronic issue could have been avoided if laboratory staff had heeded previous transfusion history

Case 10: Failure to merge patient records from a previous computer system resulted in the antibody history being inaccurate and patient receiving incorrectly phenotyped units

A sample was received from a patient with a history of anti-E documented on a previous computer system. However, this information was not present on the current LIMS. The antibody was not detected by the antibody screen and the BMS took no account of the patient history. An unselected unit of red cells was allowed to be issued on the current LIMS that was later identified to be E-positive.

Learning point

- Laboratory staff must take care when using legacy systems to ensure that all data affecting patient safety is migrated to replacement systems. The British Committee for Standards in Haematology (BCSH) Guidelines for the specification, implementation and management of information technology (IT) systems in hospital transfusion laboratories (BCSH Jones et al. 2014) state *'Retaining operational data on a legacy system that is not electronically linked to the operational system (i.e. interrogating a separate database which is a manual step), is not acceptable for maintaining patient safety within the transfusion laboratory.'*

Incorrect phenotype n=45 (41 laboratory and 4 clinical errors)

In 41 cases laboratory staff issued incorrectly phenotyped units to patients; 2 resulted in sensitisation, one patient developed anti-E and another experienced haemolysis as anti-c was missed during pre-transfusion testing.

In summary:

- 19 testing errors (18 procedural errors and 1 interpretation error)
- 15 sample receipt and registration errors (in 14 the patient's historical records were not consulted, and in 1 incorrect patient demographics were entered)
- 6 component selection errors
- In 1 case the Blood Service red cell immunohaematology (RCI) laboratory supplied an incomplete report that did not record the phenotype of the patient

Additional testing and sample receipt and registration errors are discussed in the laboratory chapter, Chapter 11 Summary of Events Originating in the hospital transfusion laboratory.

The other 4/45 cases resulted from clinical failures to inform the transfusion laboratory that the patient required phenotyped units.

- In two cases, the need for phenotyped units was not indicated on the request
- In one case the clinical staff associated the sample with an emergency department number so the flag for a known anti-Fy3 was missed because the historical record was not reviewed

- In one case, the patient showed the clinical staff an antibody card 4 days after the transfusion. The card had been issued 29 years previously from another Trust/Health Board

Case 11: A pregnant woman fails to receive CMV negative red cells

A pregnant woman (gestation 19 weeks) was having a liver transplant. The red cells requested and transfused were not CMV negative because the blood transfusion laboratory was unaware the patient was pregnant. The requestor did not select CMV negative or indicate that the patient was currently pregnant on the request form. This was discovered when documented on the second request form after the initial red cells had already been administered. There was no historical record in the transfusion laboratory for this patient.

This unusual case highlights the need for communication between the clinical and laboratory staff. It must never be assumed that the laboratory staff will know what the patient's requirements are and they should be confirmed by selecting the appropriate option on every request form. This includes obstetric patients who may be being treated in a non-obstetric location and particularly shared care patients who have been transferred from another hospital. Patients may have an alert card or know they need 'special blood' but it is not their responsibility alone. If there is any doubt, the requestor should contact the transfusion laboratory or the haematologist to discuss individual patient needs – time permitting.

Blood warmer not used for patients with cold agglutinin disease n=3

In three cases the prescription documented that the patient needed a blood warmer for red cell transfusion but this guidance was not followed. One of the patients in this group reported 'feeling shivery' during transfusion.

Near miss SRNM cases n=99

The near miss incidents relating to patients' specific requirements show similar learning points to the full incidents which led to a transfusion of components where specific requirements were not met.

Point in the process	Type of error made	Number of cases	Percentage of cases
Request	Failure to request irradiated	29	38.4%
	Insufficient information for phenotyping	6	
	Failure to request CMV negative	3	
Sample labelling	Incorrect labelling, so not linked to history	2	2.0%
Sample receipt	Failure to notice request for irradiated/CMV negative	29	29.3%
Testing	Incomplete testing prior to issue	9	12.1%
	Interpretation	2	
	Equipment failure	1	
Component selection	Failure to issue irradiated	6	17.2%
	Failure to issue correct red cell phenotype	11	
Component labelling	Component mislabelled	1	1.0%
Total		**99**	**100%**

Table 9.8: Near misses that could have led to IBCT-SRNM n=99

Information technology (IT)-related IBCT-SRNM cases n=128

There were 128 IBCT-SRNM cases that also had an IT element and these are described below. The numbers are included in the tables above where appropriate, so these are not additional cases. There were 49 laboratory errors, and 79 clinical errors.

Use of the historical computer record: laboratory n=18 and clinical n=15

In 18 laboratory cases the historical record was not consulted, or not linked to the current record, when selecting suitable blood components for transfusion.

- In 14 cases the blood selected was not of the correct phenotype either because the patient had historical antibodies but a negative antibody screen, or because there were other red cell antigens that should have been selected for
- In 4 cases non-irradiated blood components were issued because the historical record was not identified or merged

There were 15 clinical cases where the historical record was not consulted or linked to the current record. The primary error was in the request in 13, in 1 there was communication failure and 1 patient was registered under a different hospital number.

- 2/15 non-phenotyped blood selected for a patient in error
- 12/15 non-irradiated blood components were issued in error: 5 of these were shared care patients where the information was on a computer record but not the one available at the time of issue of the blood or platelets
- There was 1 clinical case where a woman was being transfused electively in pregnancy and non-CMV tested blood was transfused

Warning flags not in place, not heeded or not used laboratory n=27, clinical n=63

There were 10 cases where a warning flag was in place on the LIMS but was not heeded.

- 5/10 did not receive irradiated components
- 1/10 did not receive CMV negative components
- 2/10 did not receive the antigen-negative blood that was required
- 2/10 were given the right blood but were reported because procedures were not followed

In a further 16 cases a warning flag was not activated, or not updated with current information. In the following instances (13/16) this resulted in:

- 6/13 issue of non-irradiated components
- 1/13 did not receive HLA-matched platelets
- 4/13 antigen-negative requirements were not met
- 2/13 patients born after January 1st 1996 were not given MB-FFP because the flag was incorrectly set as <16 years and the patient was between 16 and 17 years

There were 64 cases where flags were not used but might have prevented errors had they been in place. Most of these were 50 clinical cases but in a further 5 laboratory cases flags could have been used to prevent the issue of non-irradiated components. On two occasions standard platelets were issued to patients that needed platelets resuspended in additive solution but fortunately there were no adverse reactions.

Incorrect Blood Component Transfused: Serial Errors and Multiple Missed Opportunities to Detect an Earlier Error

In 2013 SHOT analysed cases where an incorrect blood component was transfused (IBCT) to identify not only the primary error but also to see if there were further opportunities to detect the primary error later in the nine-step transfusion process. We have repeated this for 2014.

There has been an increase in IBCT reports in 2014 with 278 cases compared to 247 in 2013. The reports have been sub-divided into wrong component transfused or specific requirements not met. Table 9.9 shows the nine steps in the process and where the errors occurred.

Figure 9.2: A review of errors resulting in incorrect blood components transfused and missed opportunities for detection n=692 (278 reports)

In 13 reports (1 laboratory; 12 clinical) the errors could not be attributed to a missed step in the transfusion process but were due to communication failures e.g. shared care patients (between hospitals and failure to notify of haemopoietic stem cell transplant) and in one case between the reference laboratory and the hospital laboratory (Case 18).

Table 9.9: Comparison of primary error and missed opportunities for detection

Steps in the transfusion process	Number of cases by step of primary error	Missed opportunities to detect the primary error	Total steps in the process where an error was made or an opportunity was missed to detect the primary error
Request	108	0	108
Sample taking	0	0	0
Sample receipt	55	21	76
Testing	42	13	55
Component selection	21	91	112
Component labelling	3	8	11
Collection	23	5	28
Prescription	11	129	140
Administration	2	160	162
Total	**265 cases**	**427 missed opportunities**	**692 errors**

Missed opportunities to detect the primary error

Multiple errors in the transfusion process are common (median number 3, Figure 9.3). A review of the steps indicates how and when some of these errors could have been identified at different critical points in the transfusion process.

Figure 9.3: Number of steps with errors in each transfusion: n=265 reports

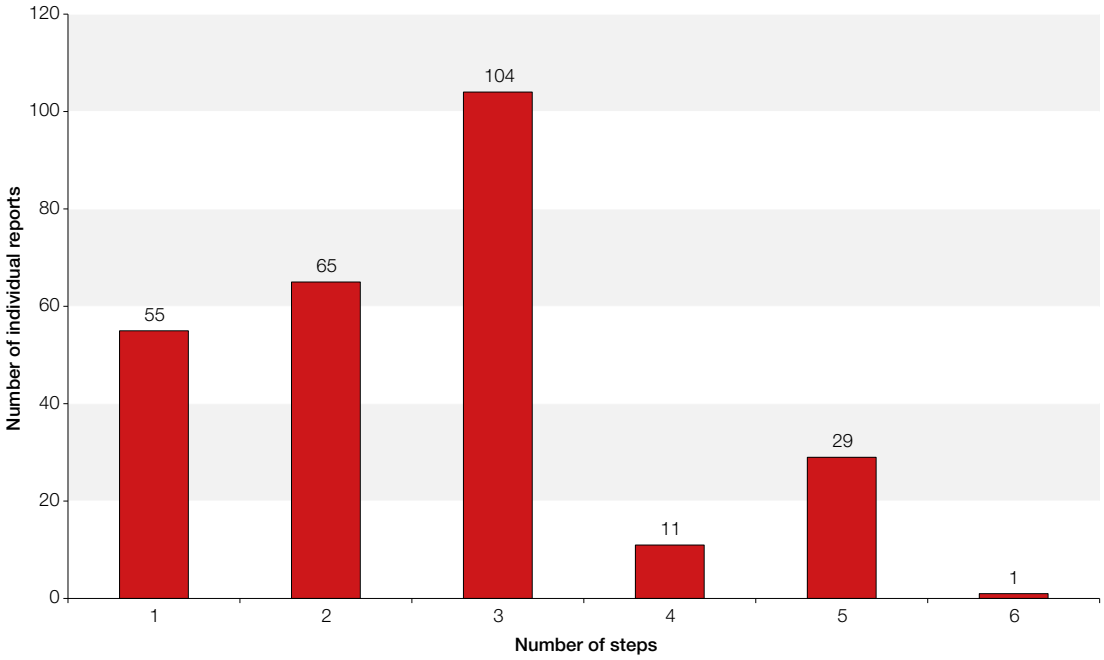
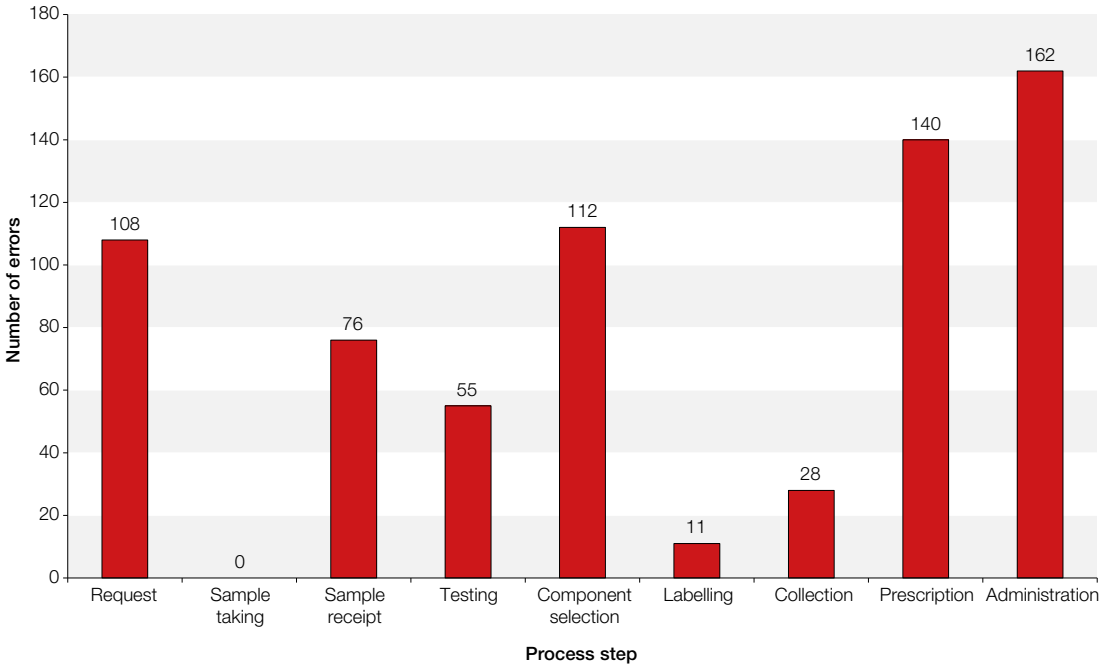


Figure 9.4: Steps in the process where an error was made or an opportunity was missed to detect the primary error n=692



Six steps: A case where there were 5 opportunities to detect the primary error n=1

The primary error occurred in the laboratory at sample receipt and registration and was followed by a further 5 opportunities to detect the error; at component selection, component labelling, collection, prescription, and administration.

Case 12: The biomedical scientist (BMS) did not heed the request and selected the wrong component

A request for 4 units of solvent-detergent fresh frozen plasma (SD-FFP) was received for a patient with a bleeding disorder. The initial request for FFP was made by telephone and the BMS started thawing standard FFP. The request form arrived and the BMS failed to notice that SD-FFP had been requested and continued to issue and label the thawed FFP.

1. **Primary error: Request**: The initial telephone request failed to identify the correct component required
2. **Component selection**: The component was not selected based upon the request form which clearly indicated the component required
3. **Component labelling**: A final check during component labelling failed to cross-check the request form
4. **Collection**: the collector did not check that they had collected the right component
5. **Prescription**: The requirement for SD-FFP was not specified on the prescription chart to prompt the person performing the bedside check
6. **Administration**: The final bedside check failed to identify the right component was to be transfused

Five steps: Cases where 4 opportunities for detection followed the primary error n=29

- In 21 cases the primary error at the point of request was followed by a further 4 missed opportunities to detect the error. All 21 cases resulted in specific requirements not being met with the same combination of primary error and opportunities for detection
- In 8 cases the primary error occurred in the laboratory, and 3 of these resulted in a wrong component being transfused

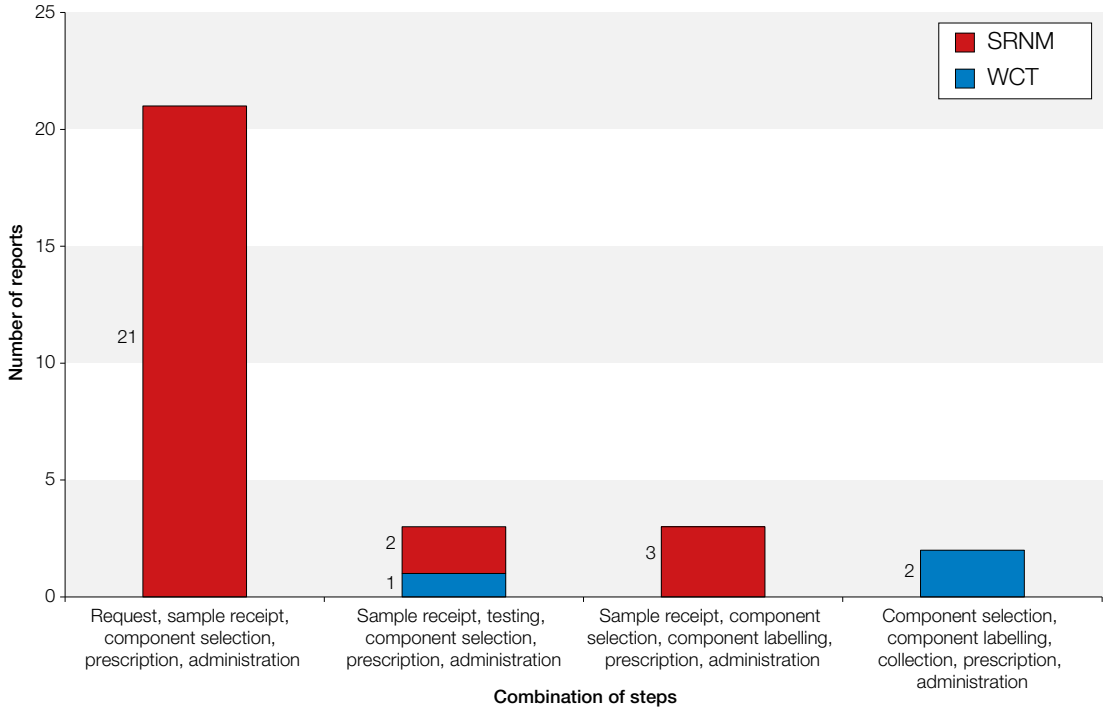


Figure 9.5: Combinations of primary and opportunities for detection: 5 steps n=29

WCT=wrong component transfused SRNM=specific requirements not met

Case 13: A patient was transfused non-irradiated red cells following mistakes in both the clinical and laboratory areas

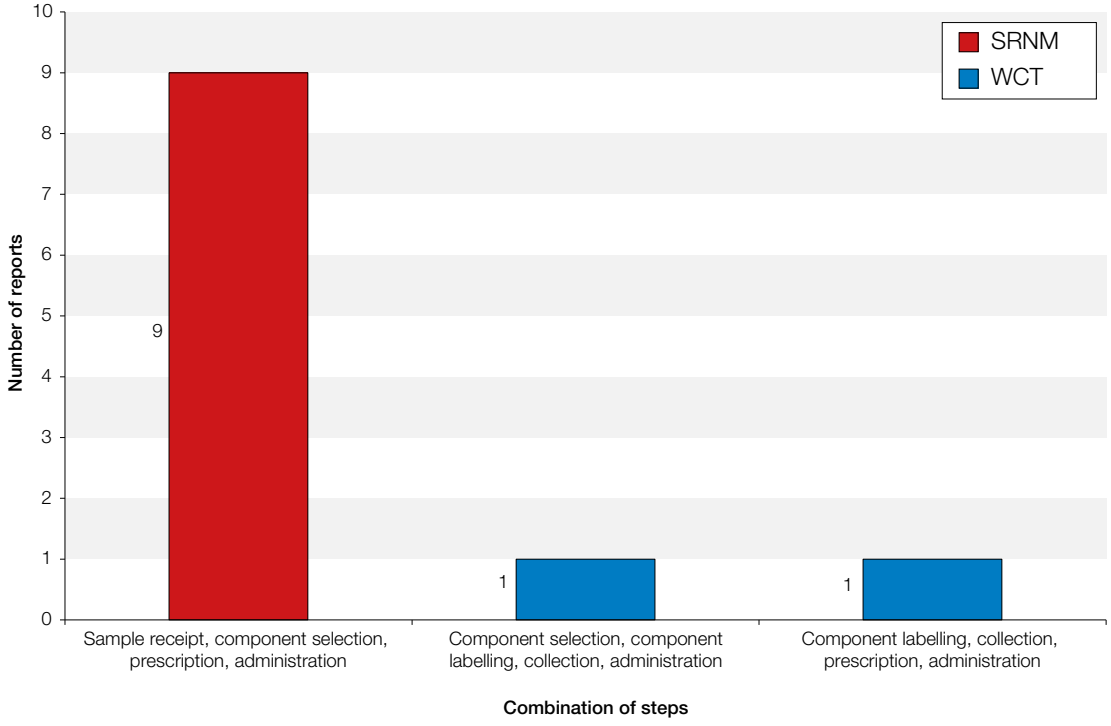
An 83 year old man required an urgent red cell transfusion. He had a past medical history of chronic lymphocytic leukaemia and had been admitted to the emergency department with possible neutropenic sepsis. Irradiated blood components had not been requested and the transfusion laboratory staff did not check patient details on the old laboratory information management system (LIMS). The new LIMS had not been updated to indicate that irradiated components were required. Three units of non-irradiated red cells were issued and transfused.

1. **Primary error: Request**: The need for irradiated components was not documented on the request form
2. **Sample receipt and registration**: The need for irradiated components was recorded on the old LIMS but had not been transferred to the new LIMS – this was missed by the BMS
3. **Component selection**: The specific requirement was not considered when the units of red cells were selected
4. **Prescription**: The need for irradiated components was not recorded on the prescription chart to prompt the person administering the blood that the patient had specific requirements
5. **Administration**: The need for irradiated components was not detected prior to administration and non-irradiated components were transfused

Four steps: Cases where there were 3 opportunities to detect the primary error n=11

In all these 11 cases the first error occurred in the laboratory (Figure 9.6), and could have been identified at several later steps in the clinical area, i.e. collection, prescription, final bedside check.

Figure 9.6: Combinations of primary error and opportunities for detection: 4 steps n=11



Case 14: Failure to heed available information on the LIMS

Red cells were requested for a haemopoietic stem cell transplant (HSCT) patient who required irradiated components. The BMS failed to follow the instructions on the LIMS to issue irradiated components. The LIMS did not control the selection of special requirement components and allowed the issue of non-irradiated red cells.

1. **Primary error: Sample receipt and registration**: The requirement for irradiated components was documented on the request form but missed by the BMS at the sample receipt and registration stage
2. **Component selection**: The specific requirement was not considered when red cell units were selected and the LIMS flag was ignored
3. **Prescription**: The need for irradiated components was not recorded on the prescription chart to prompt the person administering the blood that the patient had specific requirements
4. **Administration**: The need for irradiated components was not detected at the bedside check and non-irradiated components were transfused

Three steps: Cases where there were 2 opportunities to detect the primary error n=104

This is the largest group with the majority, 89/104, (85.6%) initiated by clinical errors.

- 72/104 (69.2%) were linked to the failure to provide irradiated components
- In 15/104 cases the primary error occurred in the laboratory, resulting in in 2 cases of wrong component transfused (1 where a woman of childbearing potential received D-mismatched platelets without anti-D Ig risking D-sensitisation, and in the other red cells of the wrong ABO group were given to an HSCT patient)

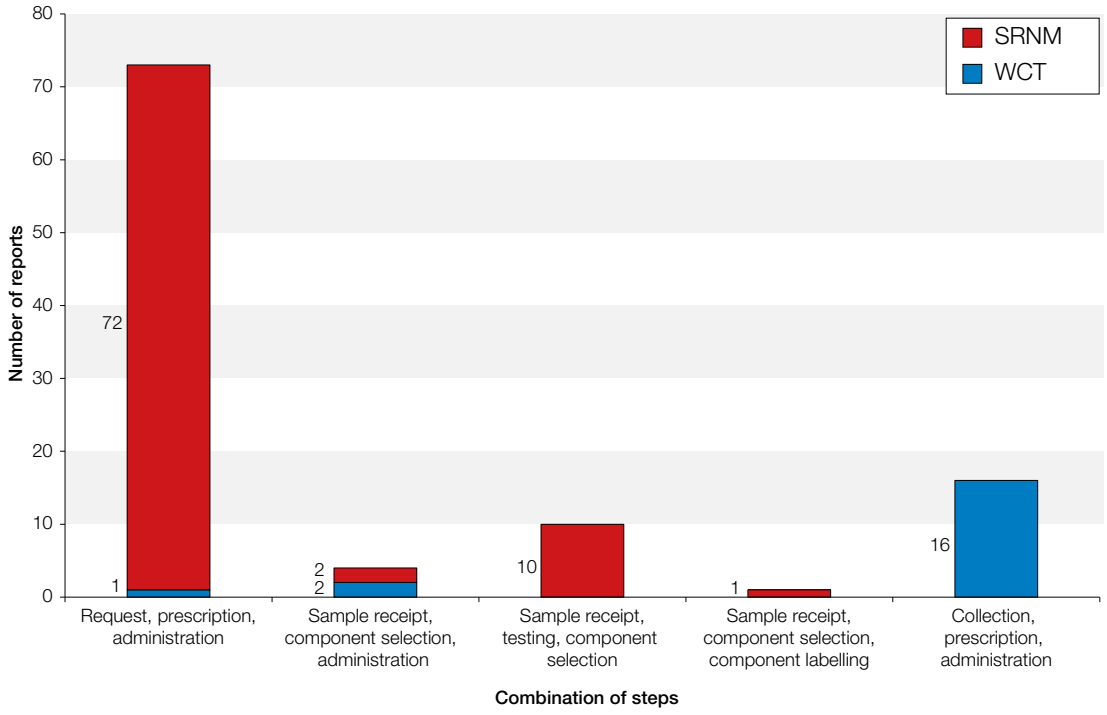


Figure 9.7: Combinations of primary error and opportunities for detection: 3 steps n=104

Case 15: Component collection error (platelets) leads to incorrect component type being documented as transfused (red cells)

A 65 year old man was admitted to the ward from the day unit following a transfusion of platelets at 17:12. The documentation showed that a bag of platelets had been recorded against the prescription for red cells meaning that the patient had received the wrong component. The patient then received another unit of platelets at 21:30 as prescribed because the staff were not aware that the platelets had been administered earlier in error. The patient received 2 units of platelets but only one had been prescribed.

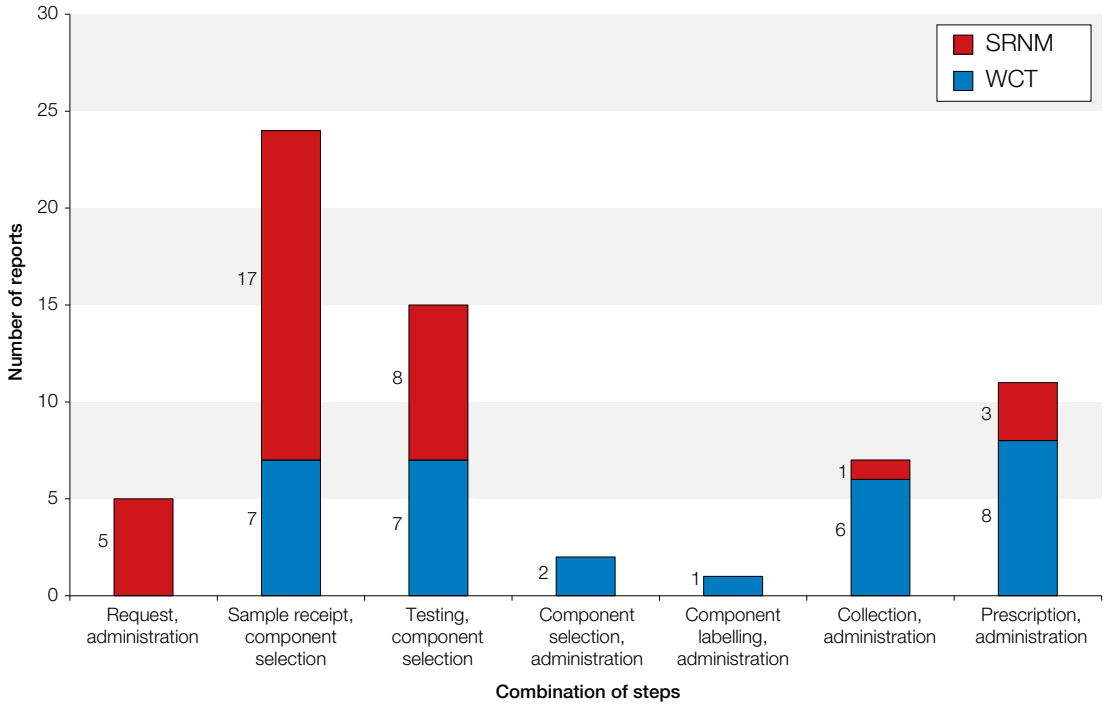
1. **Primary error: Collection**: The incorrect component type was collected from the laboratory – platelets instead of red cells
2. **Prescription**: The prescription was signed against the red cells
3. **Administration**: The collection error was not detected during the final check bedside check

Two steps: Cases with a single opportunity to detect the primary error n=65

In 42/65 (64.6%) cases the primary error occurred in the laboratory, in sample receipt, testing, component selection or component labelling.

- In 25/42 cases (59.5%) the patient received units of the incorrect specification and only 3 of these could have been detected at the final bedside check
- In 39/42 cases (92.9%) the primary error occurred in the laboratory at either the sample receipt or testing stage that could have been detected at the component selection stage by laboratory staff but was missed

Figure 9.8: Combinations of primary error and opportunities for detection: 2 steps n=65



Case 16: Misunderstanding of test results with selection of wrong Rh type

An urgent request for 2 units of red cells was received for a female patient. This was the first time this patient was tested. The D group showed a weak result against the anti-D with a negative control. The BMS then selected 2 units of O D-positive red cells instead of O D-negative red cells. The sample was sent to a reference laboratory for confirmation of the D group.

1. Primary error: Testing: The testing was incomplete having a an unconfirmed weak D result

2. Component selection: Selected D-positive instead of D-negative units

Single opportunity to prevent a wrong transfusion n=55

In 55/265 (20.8%) reports, a single error was made that could not have been detected later in the transfusion process. These occurred at different stages shown in Figure 9.9. Laboratory errors were responsible for 44/55 (80.0%) of these cases and are discussed in more detail in Chapter 11 Summary of Events Originating in the hospital transfusion laboratory.

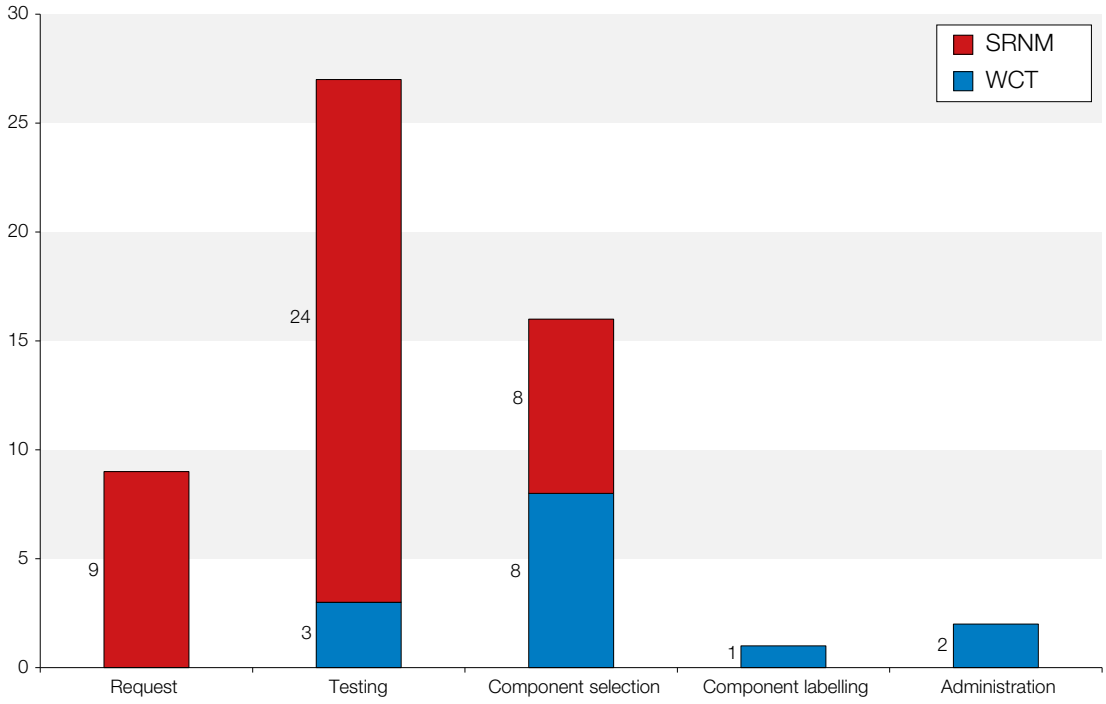


Figure 9.9: Primary errors with no further opportunities for detection: 1 step n=55

Case 17: Patients with sickle cell disease should be phenotyped prior to transfusion and receive Rh- and K-typed units

A child with sickle cell disease received 2 units of red cells that were compatible but not phenotype-matched, and a further 2 units 6 years later, again not phenotype-matched. Six months later following a further request it was noted that the patient had developed anti-C. Further testing identified the patient as C-negative (R_0r=cDe/cde) and that she had initially been transfused a C-positive unit. The BMS had failed to follow the standard operating procedure (SOP) to have a phenotype performed in the first instance prior to red cell issue.

1. **Primary error: Component selection** Phenotype-matched red cells should have been selected for issue

Other cases where errors occurred outside the steps of the transfusion process n=13

These cases were due to issues outside of the process described in Table 9.9 for example problems with communication in shared care cases and failure to forward transplant protocols to the laboratory.

Case 18: Incomplete information transmitted from the Blood Service: Communication failure

A reference laboratory issued an incomplete Rh-phenotype report when reporting an anti-Jk^a. The error was compounded by the transfusion laboratory staff who failed to fully transcribe the reported results into the LIMS. The patient then subsequently developed an anti-E following transfusion of Rh-unselected, Jk^a-negative red cells. The reference laboratory has now standardised the reporting of results.

Case 19: Failure to communicate the patient-specific requirement protocol to the transfusion laboratory leads to patient receiving platelets of an unsuitable group

A 4 year old patient was transferred from another hospital with history of HSCT for acute lymphoblastic leukaemia. The medical team failed to communicate the protocol and patient was transfused a unit of platelets which were of an unsuitable ABO group. Post transplant the patient's own group was O D-positive, donor group was A D-positive. The protocol stated that the patient should be issued group A platelets. Group O platelets were issued and transfused.

COMMENTARY

The individual steps in the transfusion process incorporate independent checks at each stage which are designed to confirm the details and so to detect earlier errors (BCSH Harris et al. 2009).

The pre-administration bedside check is a fundamental step as it is the final opportunity to detect a previous error and prevent a wrong transfusion. This final check could have detected 162/265 (61.1%) of these cases, and thus prevented transfusions of incorrect blood components.

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