9 Incorrect Blood Component Transfused (IBCT) n=296

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Definition:

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 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 a 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

- Accurate patient pre-administration checks are critical to transfusion safety – lack of proper patient identification could lead to a fatality. PPID does not only apply to blood transfusion; confirming patient identity is vital at every point of patient care
- Disparities between competency-assessment, knowledge and skills impact on transfusion safety. These gaps lead to basic errors which can cause significant negative impact in patients
- Electronic systems should act as an additional barrier. Staff must not become reliant on IT systems providing a fail-safe in place of scientific and clinical knowledge
- Understaffing, staff sickness, recruitment and retention issues, and use of agency staff can add to pressures already existing in both the clinical and laboratory setting, including placing a training burden on the remaining staff. Where this impacts on transfusion safety this should be escalated
- IT alerts should be relevant, understandable to the user, not easily overridden and have associated actions. These should be regularly reviewed and updated where appropriate

Abbreviations used in this chapter

ABOi	ABO-incompatible	**HDU**	High dependency unit
BMS	Biomedical scientist	**HLA**	Human leucocyte antigen
BSH	British Society for Haematology	**HSCT**	Haemopoietic stem cell transplant
CAS	Central alerting system	**ICU**	Intensive care unit
CMV	Cytomegalovirus	**IBCT**	Incorrect blood component transfused
DHTR	Delayed haemolytic transfusion reaction	**ID**	Identification

FFP	Fresh frozen plasma
LIMS	Laboratory information management system
MH	Major haemorrhage
MHP	Major haemorrhage protocol
MHRA	Medicines and Healthcare products Regulatory Agency
NM	Near miss
PPID	Positive patient identification
IT	Information technology
SOP	Standard operating procedure
SRNM	Specific requirements not met
UKTLC	United Kingdom Transfusion Laboratory Collaborative
WBIT	Wrong blood in tube
WCT	Wrong component transfused

Recommendations

- If staff are interrupted and/or distracted during the final pre-administration check, they must re-start the process from the beginning (BSH Robinson et al. 2018)

Action: All staff in transfusion, ward managers

- Collection is a critical step in the transfusion process – barriers such as collection checks and smart refrigerators must be in place to reduce errors

Action: Transfusion service managers, hospital transfusion teams and risk management teams

- Ensure that competency and training is effective and robust. Competency-assessment must be of value, rather than a tick box exercise

Action: Training leads

- Laboratory staff providing training should have knowledge of transfusion to ensure training is of sufficient standard, in line with UKTLC standards (see 'Recommended resources')

Action: Transfusion laboratory managers

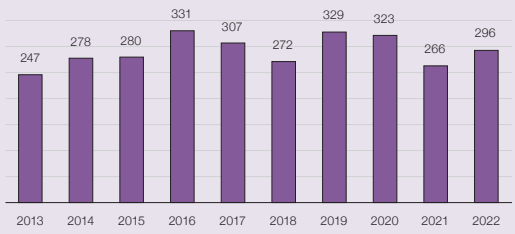
- LIMS must be used to their full potential to ensure the correct component is issued to the patient which meets all requirements for their clinical picture

Action: LIMS suppliers, transfusion service manager

Headline data 2022

Number of reports n=296
Deaths n=2
Major morbidity n=5

IBCT reports by year



Demographic data

Male n=137
Female n=144
Unknown n=15

Adults n=242
Paediatric n=37
Unknown n=17

Blood component data

Red cells n=241
Platelets n=30
Plasma n=7
Multiple components n=15
Granulocytes n=1
Cryoprecipitate=1
Unknown n=1

Introduction

Incorrect blood component transfused (IBCT) events have the potential to cause major morbidity or patient death, as evident in the 2022 Annual SHOT Report data. These errors accounted for 296/3499 (8.5%) of all reports analysed by SHOT in 2022. The proportion of IBCT cases in 2022 is similar to data from 2021, 266/3161 (8.4%). The total number of IBCT-WCT reports has slightly decreased in 2022 to 87 from 93 in 2021, with an increase in the number of IBCT-SRNM reports to 209 from 173 in 2021. Figure 9.1 provides an overview of reports submitted to SHOT in 2022 where an incorrect blood component was transfused. This category includes instances where wrong components were transfused, and/or specific requirements were missed.

Figure 9.1: Overview of reports where an incorrect blood component was transfused in 2022 (n=296)

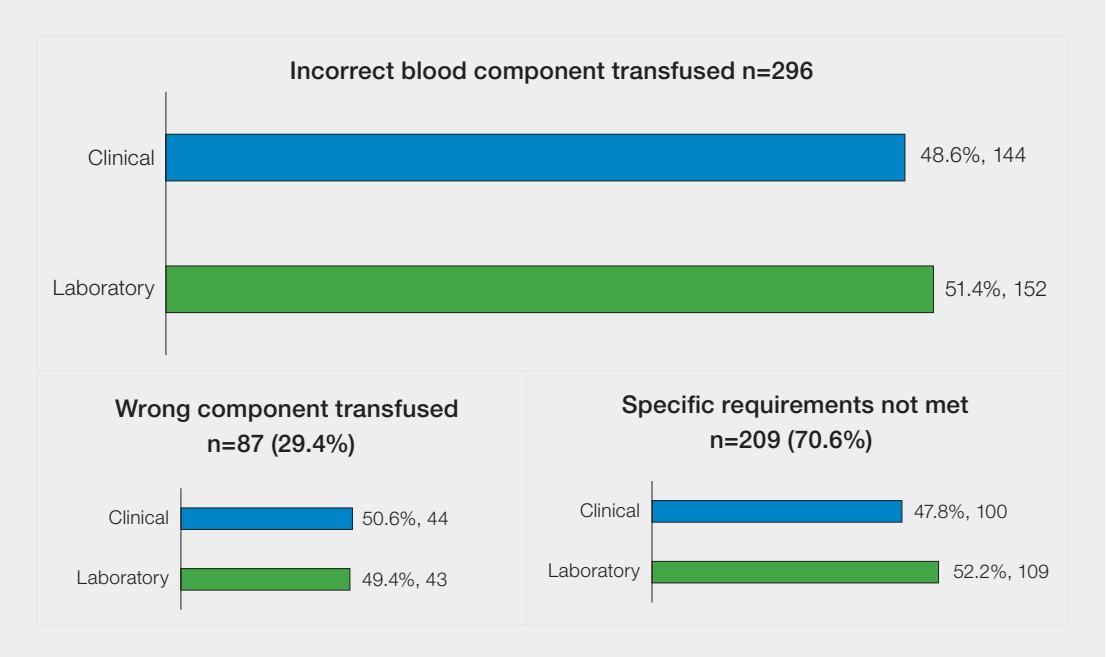
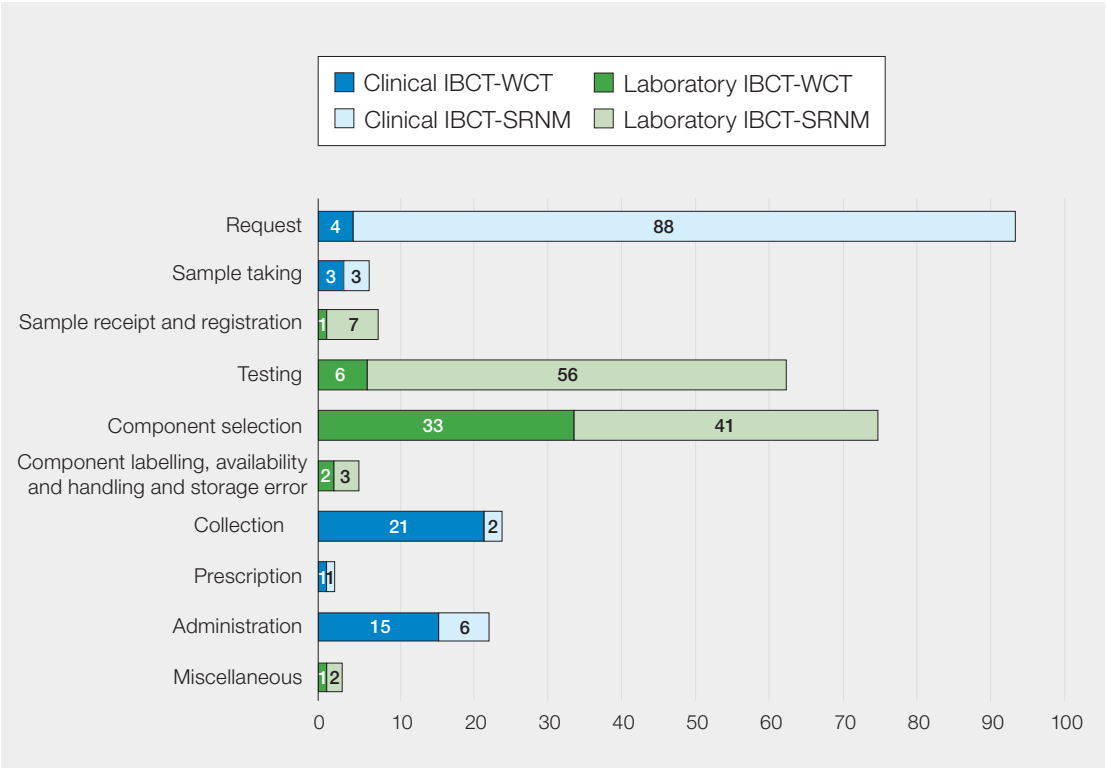


Figure 9.2: Total IBCT errors categorised by the step where the error occurred (n=296)



IBCT-SRNM=incorrect blood component transfused-specific requirements not met; IBCT-WCT=IBCT-wrong component transfused

Most clinical errors occurred at the request step of the transfusion process with 92/144 (63.9%) reports, followed by 23/144 (16.0%) at collection and 21/144 (14.6%) at administration. In the laboratory the majority of errors occurred at the component selection 74/152 (48.7%) and testing, 62/152 (40.8%) stages.

Deaths related to transfusion n=2

There were 2 patient deaths in 2022 due to IBCT-WCT errors (each assigned imputability of 1, possible). Both were the result of ABOi red cell transfusions with the primary error in both occurring at the collection step. These are discussed as Cases 9.1 and 9.2.

Case 9.1: Collection error and lack of pre-administration PPID leads to an ABOi transfusion

Following cardiac surgery, a female in her 70s received an ABOi transfusion during a MH. The patient was group O D-negative and was inadvertently given B D-positive. A unit of red cells was collected by a porter from the issue refrigerator, but this was for another patient on a different ward. None of the details on the issue label/compatibility label were checked. Soon after, the porter realised the error and reported to laboratory staff, but the red cell unit had already been transfused. BloodTrack® was available but not utilised and ward staff did not carry out any pre-administration checks. The emergency response team were not trained to use BloodTrack®. The ward staff were inexperienced in dealing with MH and this event was very unusual and traumatic for those involved. The patient died on return to theatre and the death was attributed to complications of cardiac surgery.

Investigation of this incident found that the porter was already dealing with multiple tasks when the MHP was activated. The porter did not take the BloodTrack® collection slip to the refrigerator. Had they collected the appropriate blood transfusion slip before going to the transfusion laboratory refrigerator, they would have scanned in the BloodTrack® code for the correct patient, and it would not have been possible to remove the blood component intended for another patient. The ward nurse did not verbally confirm the patient's details with the porter, nor did they check the unit itself to confirm it was for the correct patient before handing the blood component over to a colleague who was directly involved in the emergency. Pre-transfusion administration safety checks to ensure the correct unit of blood was being given to the correct patient were not carried out. The organisational policy stipulated the use of the BloodTrack® system to perform pre-transfusion safety checks. As per their policy, if the BloodTrack® system was not available for any reason, a manual, two-person check should have been performed prior to administering each unit of blood. The staff involved in this incident were compliant with blood transfusion training and were up to date with competency-assessments.

Case 9.2: Collection error and incomplete pre-administration checks lead to a haemolytic reaction

A patient with blood group O D-positive was admitted to the HDU following a surgical procedure associated with a history of life-threatening sepsis on the background of poorly controlled diabetes. The patient was transfused A D-positive red cells as part of a routine transfusion. The collector transported the red cells from the transfusion laboratory for two patients in two different clinical areas and accidentally mixed the two blood boxes up, therefore the wrong blood component went to the wrong location. In the clinical area the pre-transfusion checking procedure was significantly disrupted as the patient would not permit the nurses to check their identification band, was displaying challenging behaviour and was demanding that staff use their chosen name (the patient was known by a chosen name that did not bear any resemblance to their formal name). There was a determined effort by staff to undertake the usual pre-transfusion checks, but this was unsuccessful.

The error was detected when the other clinical area phoned the transfusion laboratory to ask where the red cell unit was that was intended for their patient. This was 45 minutes after the blood components had been delivered to each location. Laboratory staff phoned the clinical area to explain the error, asking for the unit to be returned immediately but staff confirmed the transfusion was almost complete. The remainder of the transfusion (10-15mL) was stopped immediately. Senior medical staff

were informed, and emergency treatment was commenced. The patient required plasma exchange and renal replacement therapy. The patient died one week after the ABOi transfusion.

Whilst the case has been submitted to SHOT and the MHRA, the full incident investigation report is still awaited, and an update will be provided in the next Annual SHOT Report. Details of the case as submitted on SABRE have been included here for information.

Major morbidity n=5

One clinical case of major morbidity resulted in the admission of a patient with sickle cell disease to the HDU following an ABOi red cell transfusion (Case 9.3).

Case 9.3: Distractions, familiarity and assumptions lead to an ABOi transfusion

A male patient in his 40s (patient 1) with sickle cell disease was due to receive a routine exchange transfusion as an out-patient. The patient was O D-positive but was given B D-positive red cells. The nurse was about to administer a unit of red cells to patient 2. They became distracted because patient 1's infusion alarm sounded. The nurse, still holding the unit, addressed the alarm and then connected the unit to patient 1 in error. The patient was not wearing an ID band, PPID was not carried out as the nurse was familiar with patient 1, and no other pre-administration checks were completed.

The patient consequently experienced chest and groin pain with a feeling of impending doom and was admitted to the HDU for additional observations and monitoring. This gentleman recovered but is consequently very anxious about future treatments.

The investigation into this incident found that staff reported being overwhelmed by their workload and multiple alarms sounding at the same time. There was a lack of appropriately trained staff due to sickness at short notice. There were no effective bedside red cell exchange guidelines, and the SOP was described as 'unworkable'. Local 'workarounds' were in place for when the department was busy and there was anecdotal evidence of an under-supported, under-developed specialist service with inadequate staff numbers and skill mix.

Other cases resulting in major morbidity

The 4 laboratory cases of major morbidity resulted in sensitisation to the K antigen in patients of childbearing potential due to component selection errors as discussed in Chapter 14, Laboratory Errors. All patients were females under the age of 34, and in 3/4 cases the transfusion was required for acute bleeding directly related to pregnancy.

A further patient required admission to the ICU following a DHTR. This occurred in a patient with sickle cell anaemia who received a non-phenotype matched transfusion. The patient subsequently formed an anti-C. This case is included in the figures and commentary for Chapter 18, Haemolytic Transfusion Reactions (HTR).

ABO-incompatible (ABOi) transfusions n=6

ABOi transfusions are entirely preventable and have the potential to cause severe clinical consequences including patient death. Despite this, 6 ABOi occurred in 2022. A summary of ABOi transfusions can be seen in Table 9.1.

Five ABOi transfusions were as a result of clinical errors (collection and administration errors) and led to 2 deaths and 1 case of major morbidity. One laboratory error (component selection error) resulted in an ABOi transfusion of group O FFP to a group A patient. The error was detected by laboratory staff prior to issuing however due to the emergency, the FFP was approved for transfusion by the clinician.

Figure 9.3: ABOi cases reported in 2022 (n=6)

ABOi=ABO-incompatible; FFP=fresh frozen plasma. Note: case numbers refer to the cases in Table 9.1

Table 9.1: ABO-incompatible transfusions in 2022 (n=6)

Case number	Case 1	Case 2	Case 3
Component transfused	Red cells group B 	Red cells group A 	Red cells group B 
Patient group	Group O	Group O	Group O
Volume transfused	>50mL	>50mL	>50mL
Primary error	**Collection** Porter delivered unit to the wrong ward and Patient ID checks not carried out fully	**Collection** Porter delivered unit to the wrong ward and Patient ID checks not carried out fully	**Administration** Patient ID checks not carried out
When was error detected	Porter realised error and informed laboratory	Other ward rang laboratory to ask where their unit was	Acute adverse reaction in patient
Patient impact	**Death**	**Death**	**Major morbidity**
Imputability	1 - possible	1 - possible	3 - definite
Urgency	Emergency	Routine	Routine
MHP	Yes	No	No
Department	Ward	Ward	Haematology day unit
Adult/paediatric	Adult	Adult	Adult
Administration checklist used. Patient ID	No 1-person check	No 2-person check	No 1-person check
ID band in place	Yes	Yes	No

Case number	Case 4	Case 5	Case 6
Component transfused	Red cells group B 	Red cells group B 	FFP group O 
Patient group	Group O	Group A	Group A
Volume transfused	>50mL	2 units	>50mL
Primary error	**Administration** Patient ID checks not carried out	**Sample taking** Unable to establish further details due to passage of time	**Component selection** Lapse in concentration when selecting FFP from freezer prior to defrosting
When was error detected	When further group sample was sent to laboratory	On current sample testing (historical WBIT, 2016)	At point of thawing but due to urgency of request clinician decided to continue and transfuse
Patient impact	**No clinical reaction**	**No clinical reaction**	**No clinical reaction**
Imputability	n/a	n/a	n/a
Urgency	Routine	Urgent	Emergency
MHP	No	No	Yes
Department	Ward	Ward	Laboratory
Adult/paediatric	Adult	Adult	Adult
Administration checklist used. Patient ID	No 1-person check	Unknown	Yes 2-person check
ID band in place	No	Unknown	Yes

The remaining ABOi cases are described in full in the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2022/).

Commentary

It is disappointing to see 5 ABOi red cell transfusions, of which 2 resulted in patient death. The last ABOi-related death occurred in 2015, and there were no reports of red cell ABOi transfusions in 2021. Levels of harm following ABOi red cell transfusions are difficult to predict, and as such must be prevented. There are currently a number of pressures on healthcare staff above and beyond that which is seen as normal. The consequences of these additional pressures are evident in the increase of serious, and fundamental errors occurring. In 4 of the ABOi cases there was a failure to complete PPID prior to administration. This is a basic process in healthcare and justification for not properly identifying patients is difficult to come by. The use of a pre-administration checklist has been promoted by SHOT recommendations over the past 6 years and stipulated as a necessity by the CAS alert: 'Safe Transfusion Practice: Use a bedside checklist' (Department of Health 2017).

Two deaths occurred in 2022 due to safety checks not being performed during collection, and then subsequently not performed at the pre-administration check, however in different circumstances many more patients could have suffered the same fate. Figure 9.4 shows a summary of potential outcomes resulting from errors in the transfusion pathway and that while there were 2 deaths following ABOi, there were several errors with the potential to cause serious patient morbidity and mortality.

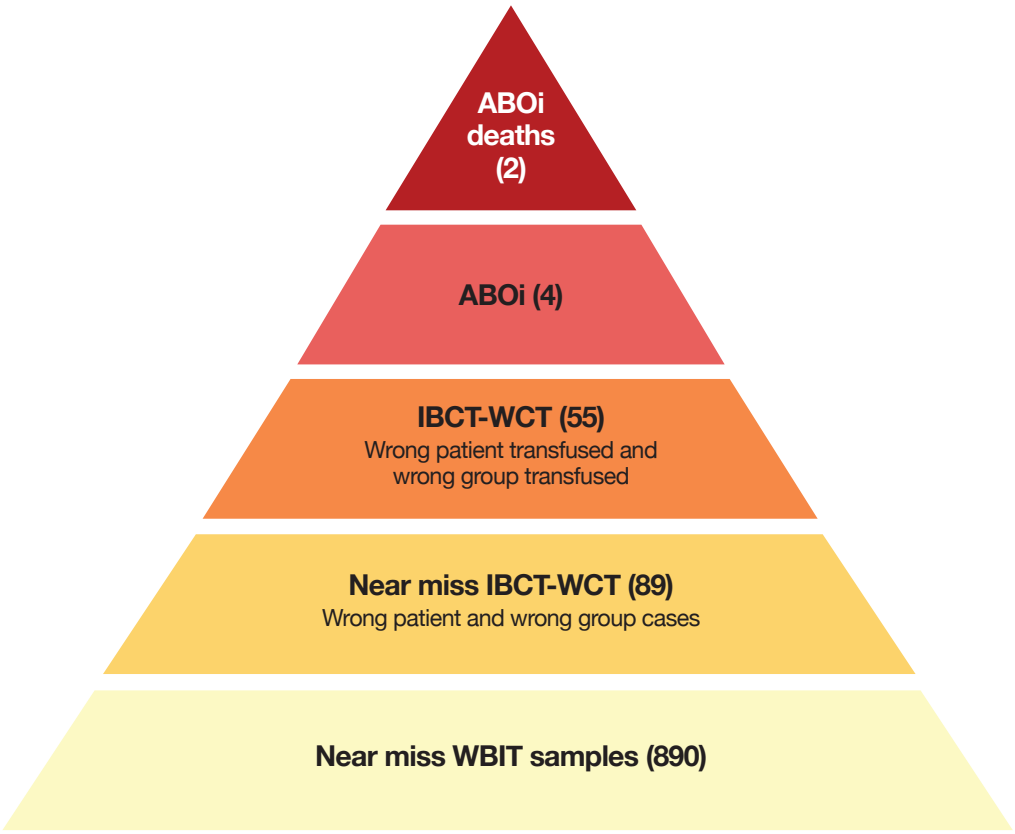


Figure 9.4: ABO-incompatible (ABOi) transfusions and events that had the potential to lead to ABOi in 2022

ABOi=ABO-incompatible; IBCT-WCT=incorrect blood component transfused-wrong component transfused; WBIT=wrong blood in tube

Many errors were detected and prevented by robust processes being employed (e.g., laboratory zero tolerance policy), however in several occurrences harm was prevented fortuitously (e.g., wrong patient transfusions where the component was ABO-compatible). In 2022 a total 19/87 (21.8%) IBCT-WCT events were due to lack of patient identification and resulted in a patient receiving a blood component which was labelled and intended for another patient. In 2/19 PID errors, the error occurred in the laboratory when handing over components to the clinical staff and 17/19 occurred in the clinical area with errors at collection and administration. These incidents need to be investigated thoroughly as any of these could have potentially resulted in ABOi and patient death. It is crucial not to simply attribute fault to the staff member for the omission, but to investigate system factors and processes, for instance ineffective transfusion policies, inability to print an ID band in a timely manner, suboptimal staff training and staffing issues.

Other factors that have been noted to be contributory include information technology available but not used, policies in place for two-person independent checking but not undertaken, untrained staff collecting blood components, and LIMS alerts either not configurable or overridden. Errors can occur at several stages of the transfusion pathway and can be cumulative. Cognitive bias including assumptions, rushing to complete work, multitasking and gaps in knowledge are recognised as contributory factors (Swarbrick et al. 2022).

Clinical IBCT events n=144

There were 144 cases reported in 2022 which is an increase from the 119 in the 2021 Annual SHOT Report.

Clinical IBCT-WCT events n=44

This is a slight increase in cases from 40 in the 2021 Annual SHOT Report.

There was a total of 15/44 (34.1%) transfusions of the wrong component type, 12/44 (27.3%) of the wrong group and 17/44 (38.6%) to the wrong patient.

Most of the IBCT-WCT errors 21/44 (47.7%) occurred at the point of collection of the component from the storage area. Of these, 4 involved staff members collecting the component/s without relevant training and were not formally assessed for this competency. Collection of blood components must only be carried out by a trained and competency-assessed healthcare worker (BSH Robinson et al. 2018). Collection as the primary error resulted in 11 wrong type of components transfused, 4 wrong blood group transfused and 6 where components were administered to the wrong patient, including 1 ABOi transfusion resulting in patient death. Reports of collection errors have more than doubled over the past 5 years, from 10 in 2018 (Narayan et al. 2019) to 21 in 2022. This trend indicates that learning from these incidents has not been optimal and incident investigations may not be effective. All systemic causal and contributory factors must be addressed to ensure better transfusion safety.

All patients receiving a transfusion must wear a patient ID band (or risk-assessed alternative) (BSH Robinson et al. 2018), but there were 3 instances where the patient was not wearing an ID band, 1 of which resulted in an ABOi red cell transfusion leading to major morbidity.

In 15/44 (34.1%) cases, the primary error occurred at the administration step of the transfusion process. Of these, 3 resulted in wrong component types being transfused, 3 wrong group transfusions and in 9 cases, blood components were transfused to the wrong patient. This step in the transfusion pathway is the final opportunity to avoid an IBCT-WCT, and must be carried out by a trained, competent and authorised healthcare professional.

It is imperative to perform the final administration checks next to the patient. The donation number, blood group and expiry date on the component pack label must match the laboratory-generated label attached to the component and the component blood group must be appropriate for the patient (BSH Robinson et al. 2018). There were 12/44 (27.3%) cases where the blood component was administered without any final pre-administration checks at the patient's side. In 2 cases, the death of the patient was possibly related to the transfusion (imputability 1), and 1 resulted in major morbidity. Short staffing, poor skill-mix and extremely busy clinical areas were noted as additional contributory factors in these incidents.

A safe transfusion checklist was produced by SHOT in response to previous recommendations and the CAS alert: 'Safe Transfusion Practice: Use a bedside checklist' (Department of Health 2017). Despite this recommendation to improve safety, no checklist was used in 19/44 (43.2%) reports of IBCT-WCT.

Learning points

- Collection of blood components remains a critical step in the transfusion process and robust procedures should be in place to ensure that necessary checks are made
- It is **vital** to carry out positive patient identification and complete all the final checks next to the patient immediately prior to administration
- **ALL** recipients of a transfusion must wear an identification band*
- **ALL** recipients must be asked to state (unless unable) their full name and date of birth which must match details on the identification band*
- **ALL** core identifiers on the identification band* must match the details on the blood component label **(or risk-assessed equivalent* (BSH Robinson et al. 2018))

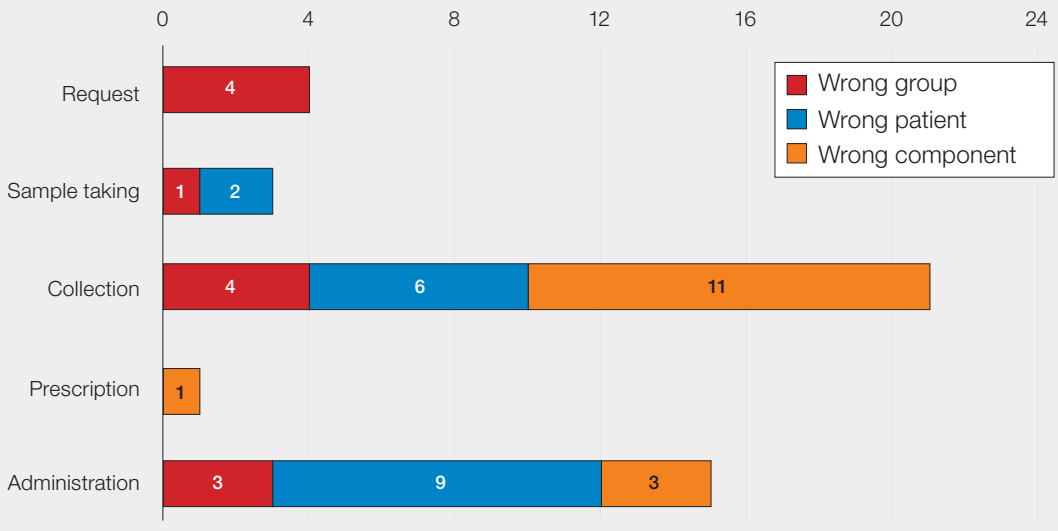


Figure 9.5: Categorisation of clinical IBCT-WCT errors by transfusion step where the primary error occurred (n=44)

Data regarding errors at the request, sample and prescription stage can be found in the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/report-summary-and-supplement-2022/).

Most errors occurred on general wards 20/44 (45.5%) with 19/44 (43.2%) being routine transfusions and 12/44 (27.3%) emergencies. Most transfusions 27/44 (61.4%) had taken place between 08:00-20:00.

IT was involved in 11/44 (25.0%) which included pager failure and problems accessing remote issue storage refrigerators. In some cases, IT systems were available but not used. This was occasionally because the user had not been fully trained to use it.

Two illustrative cases can be found in the supplementary material for this chapter. One describes a case of wrong patient transfusion where units were checked away from the bedside using a pre-printed wristband and the other describes a case of wrong component transfusion due to communication failure.

Clinical IBCT-SRNM events n=100

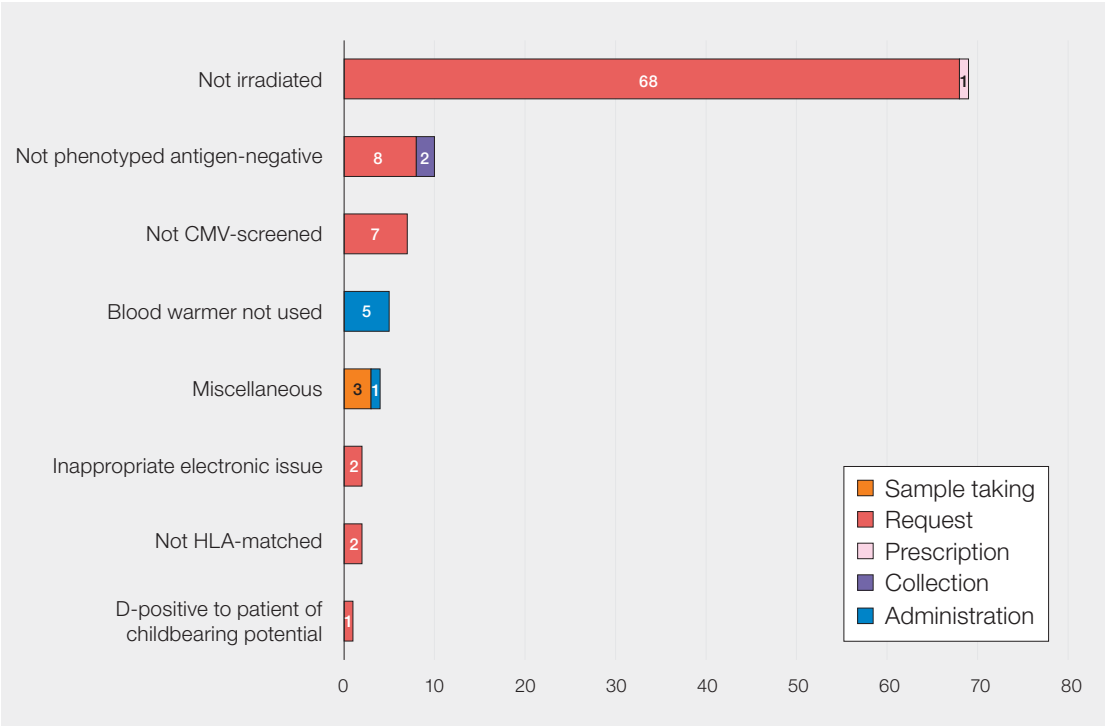
This is an increase from the 79 events in the 2021 Annual SHOT Report.

As has been the case for many years, the most common error in this category was a failure to provide irradiated components 69/100 (69.0%). Many of these recipients, 25/69 (36.2%) had a history of Hodgkin lymphoma but fortunately no patients suffered a clinical reaction. A further 26/69 (37.7%) had received purine analogues again though leading to no reactions. BSH guidelines state that cellular blood components should be irradiated for patients receiving purine analogues and Hodgkin lymphoma (BSH Foukaneli et al. 2020). The requirement for CMV-negative units was missed in 7 cases, this is a slight reduction on recent years. The need for irradiated components is most often missed in patients with current or historical Hodgkin lymphoma (Elliot et al. 2021).

In 88/100 (88.0%) reports the primary error was made at the request step in the transfusion process with 80/88 (90.9%) of prescriptions being incorrect. In 43/88 (48.9%) reports the clinical staff were aware of the requirements but they did not inform the laboratory staff. In many of these cases the requirement was omitted from the request form, with shared cared between hospitals contributing to 4 cases as there was no national database for patients' specific transfusion requirements.

There were 6 errors at administration, 5 of these were due to a blood warmer not being utilised where necessary.

Figure 9.6: Clinical IBCT-SRNM errors and transfusion step where the primary error occurred (n=100)



CMV=cytomegalovirus; HLA=human leucocyte antigen

Two illustrative cases can be found in the supplementary material for this chapter which describe a lack of consideration of pregnancy on other transfusion requirements. This illustrates the importance of accurate training, documentation and communication of transfusion requirements, as when patients have multiple transfusion requirements these can often cause confusion and anchoring bias can occur.

Learning points

- It is vital that all healthcare professionals involved with transfusion have an awareness of specific transfusion requirements, and patient cohorts where these requirements are likely to occur
- Specific requirements for transfusions should be documented in patient records (manual and electronic) and be easily accessible
- Transfusion is a team effort. Robust processes for communication of specific requirements between the clinical area and laboratory increase the likelihood of safe transfusions occurring

Laboratory IBCT errors n=152

In 2022 there has been a slight increase in reports of incorrect blood components transfused from 147 in 2021 to 152 in 2022. There has been a decrease of laboratory errors resulting in IBCT-WCT from last year from 53 to 43, but an increase in IBCT-SRNM errors from 94 in 2021 to 109 in 2022.

Wrong component transfused n=43

Error subcategory	Sample receipt and registration	Testing	Component selection	Component labelling, availability and handling and storage error
				
Number of error reports	**1**	**6**	**33**	**2***

plus 1 miscellaneous error

Table 9.2: Laboratory WCT errors in 2022

There were 43 laboratory errors which led to the wrong component being transfused, most of which were due to component selection errors (33/43).

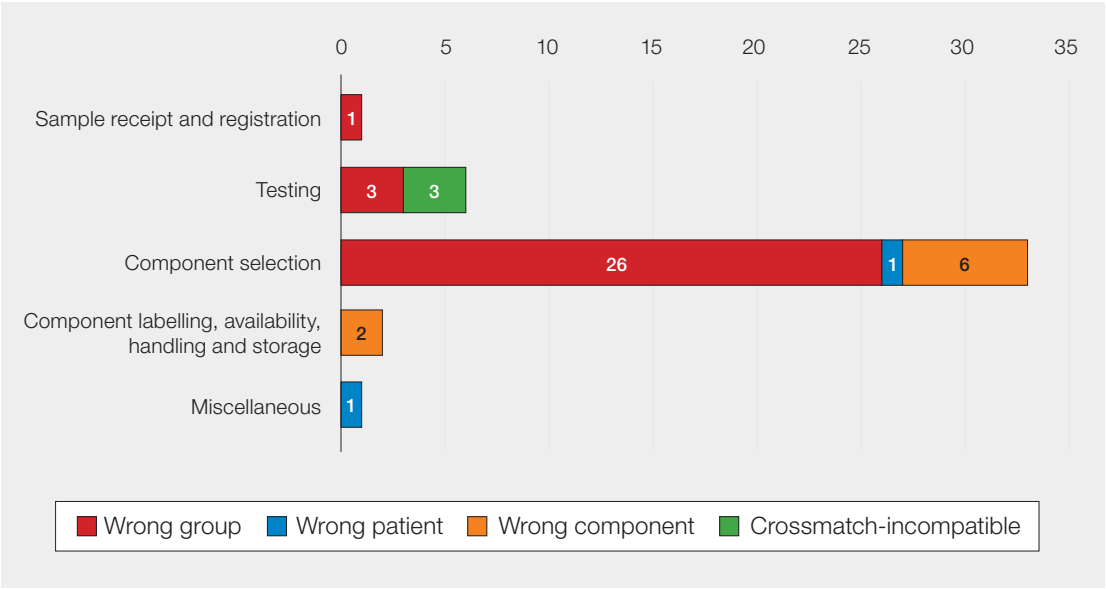
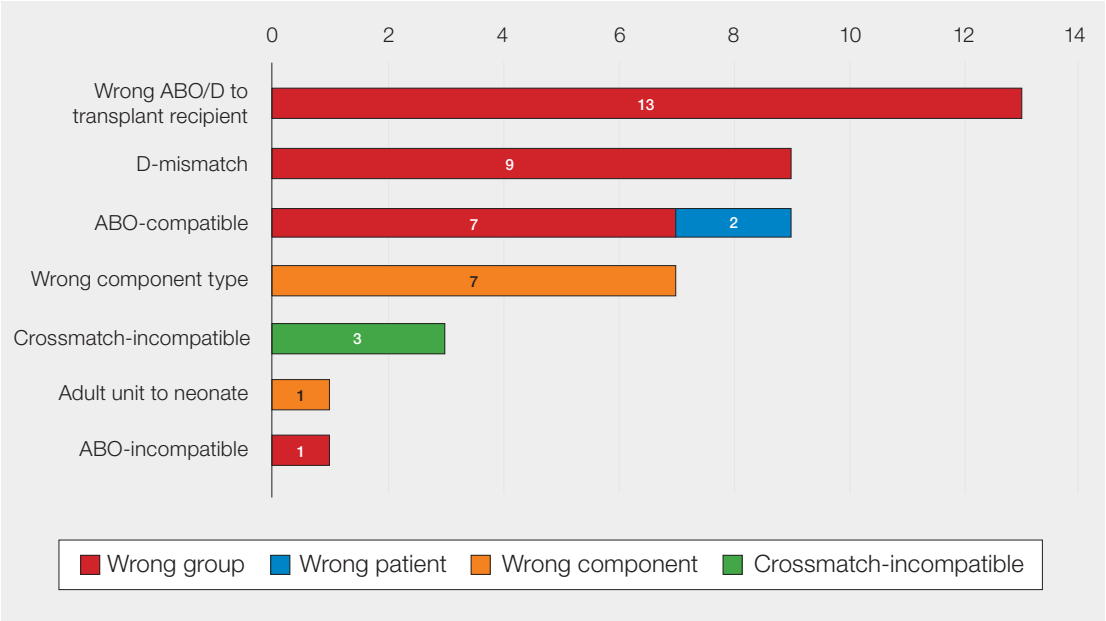


Figure 9.7: Laboratory IBCT-WCT errors by transfusion step (n=43)

Figure 9.8: Laboratory IBCT-WCT error by category (n=43)



There were 28 laboratory errors which led to the wrong ABO group being transfused, of which 13 were to transplant patients (9 HSCT and 4 SOT). All 13 transplant cases stated the errors were IT related with either the LIMS alerts being overridden by the BMS or limitations within the LIMS rules not clearly stating the requirements for this patient group.

Of the 13 transplant cases 10 had received a group O transplant but received a non-group O blood component. There were 4 cases where the transplant group had not engrafted, and 8 cases where the group had transformed into donor ABO group, but original group still given. See Chapter 25, Transfusion Errors in Transplant Patients for more information.

There were 9 laboratory errors which led to D-negative individuals receiving D-positive blood components, of which 3 were either to children or females of childbearing potential.

IT should be used as barrier in preventing IBCT-WCT errors but was stated as an influencing factor in 28/43 errors of which 21/28 led to the issue of components of the wrong ABO/D group. IT errors included LIMS alerts not heeded, lack of functionality within the LIMS, LIMS configured incorrectly, LIMS not updated correctly, and alert fatigue. Illustrative cases can be found in Chapter 15, Errors Related to Information Technology (IT) and the supplementary information for that chapter on the SHOT website (https://www.shotuk.org/report-summary-and-supplement-2022/).

Laboratory errors continue to occur where basic knowledge should have prevented the error i.e., K-positive red cells to individuals of childbearing potential, and D-positive units issued to D-negative individuals (BSH Milkins et al. 2013).

Case 9.4: D-positive red cells issued to a D-negative patient due to cognitive bias

A female patient in their 60s was admitted in renal failure, and a request of two units of red cells was made to the transfusion laboratory. The patient had a flag for irradiated components on the LIMS but, due to local policy, this required confirming with the clinical area as several years had passed since their previous admission. The local team completed the required specific requirements form, but two forms were sent to the laboratory with disparity between the requirement for irradiated components. As a precaution the BMS updated the LIMS to state continue to give irradiated until the discrepancy could be resolved. The patient was group AB D-negative, but the BMS issued A D-positive red cells in error. IT alerts were overridden as the BMS assumed these were due to ABO substitution, and as their focus remained on the irradiated requirement, they did not detect the D-incompatibility.

This case highlights the impact that alert fatigue and cognitive bias can have on the ability of staff to perform routine tasks. Staff need to be aware of the potential for such biases, and where possible these must be prevented using simple interventions such as having clear, understandable, and actionable LIMS alerts to prevent component selection errors in the laboratory.

Specific requirements not met n=109

Error subcategory	Sample receipt and registration	Testing	Component selection	Component labelling, availability and handling and storage error
				
Number of error reports	**7**	**56**	**41**	**3***

plus 2 miscellaneous errors

Table 9.3: Laboratory SRNM errors in 2022

There were 109 laboratory errors which led to the patient receiving blood components which did not meet their specific requirements, with the majority due to testing errors (56/109) and component selection errors (41/109).

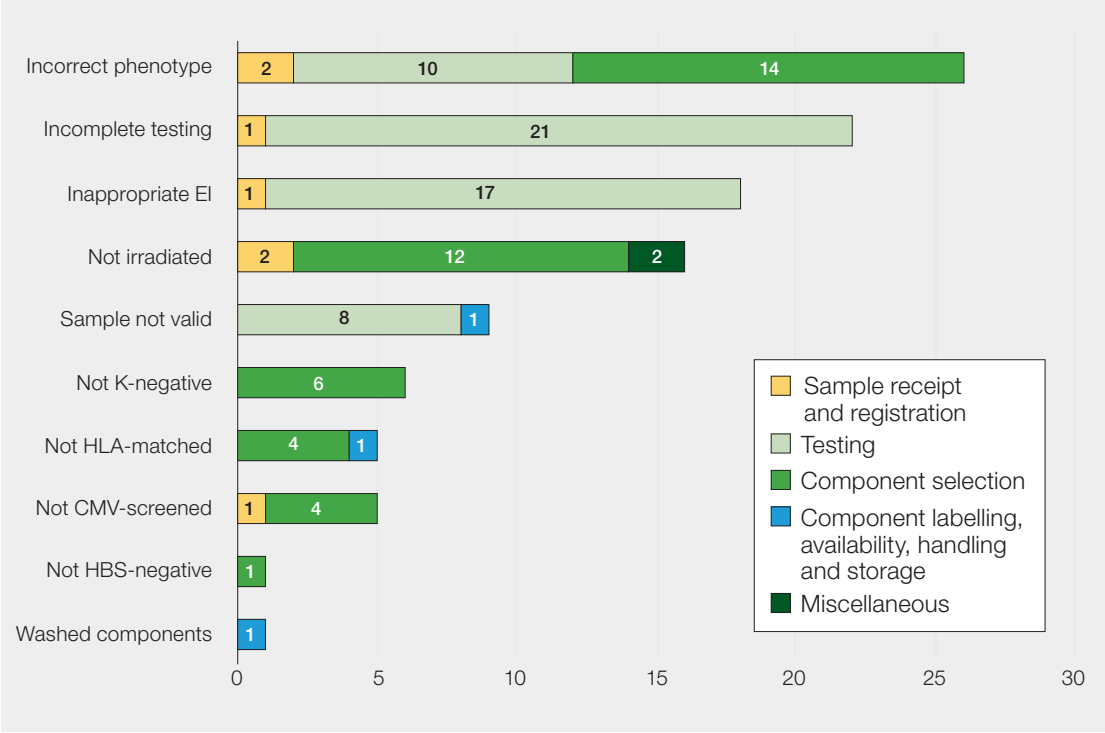


Figure 9.9: Laboratory IBCT-SRNM errors by transfusion step (n=109)

EI=electronic issue; HLA=human leucocyte antigen; CMV=cytomegalovirus

Testing errors n=56

Laboratory testing errors were due to inappropriate issue of components with incomplete testing prior to issue of components, 21/56 (37.5%), inappropriate use of electronic issue, 17/56 (30.4%), issue of red cells which were not phenotype/antigen-matched, 10/56 (17.9%) and testing performed on invalid sample (exceeding validity timing), 8/56 (14.3%). Where testing was incomplete, this was most often a failure to complete antibody identification, 7/21 (33.3%) or internal quality control, 7/21 (33.3%) prior to transfusion.

In 8/21 of the incomplete testing cases, the LIMS was not used correctly. Alerts were overridden and LIMS was set up incorrectly which allowed issue of units prior to completion of tests.

Case 9.5: Crossmatching errors resulted in a patient receiving uncrossmatched red cell units

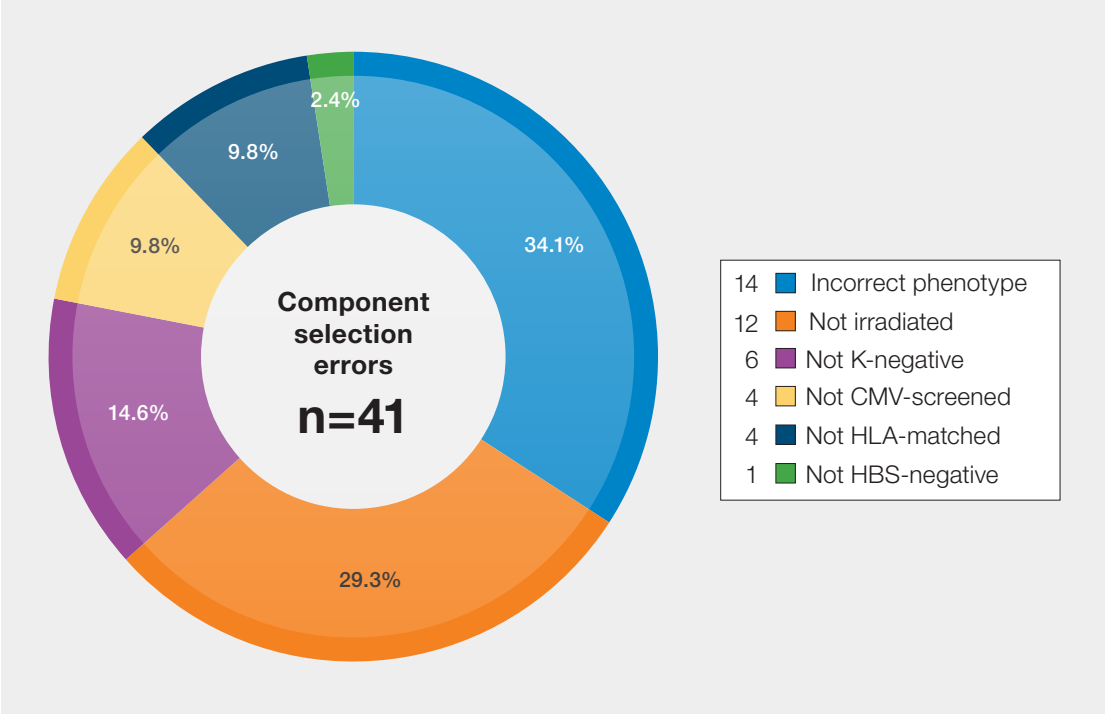
A BMS performed automated crossmatches for Patient 1 and Patient 2 on the blood grouping

analyser. In error they crossmatched the same two units of red cells against both patients. Patient 1 received the two crossmatched units, but Patient 2 received two uncrossmatched units. Later during the day, the BMS detected their error and retrospectively crossmatched Patient 2 with the correct two units, but this was after the transfusions had been completed. The staff member was a bank BMS with known stress-related issues but was working a supported day shift.

IBCT-SRNM testing errors, with illustrative figures are further discussed in Chapter 14, Laboratory Errors, plus a further case in the supplementary material for this chapter.

Component selection errors n=41

Figure 9.10: Laboratory IBCT-SRNM component selection errors 2022 (n=41)



CMV=cytomegalovirus; HLA=human leucocyte antigen

Component selection errors in the laboratory resulted in 14 patients receiving red cell units which were not phenotyped or antigen-negative for their requirements, 12 patients received blood components which were not irradiated, 6 patients of childbearing potential received K-positive red cells, 4 patients did not receive CMV-negative components, 4 patients received non-HLA selected platelets when required, and 1 patient received non HbS-negative red cells.

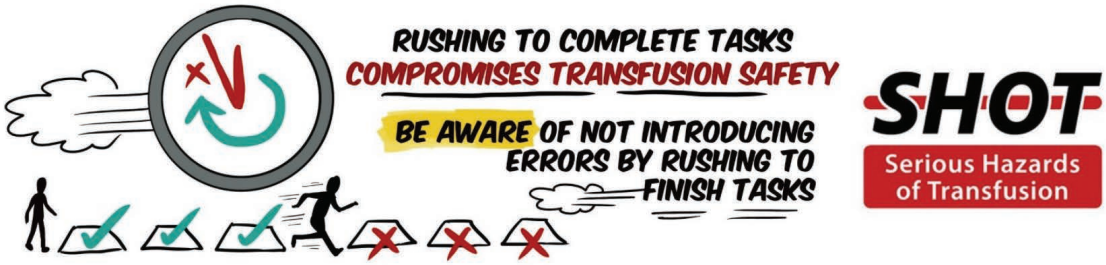
Of the 6 cases of K-positive red cells being issued to a person of childbearing potential, 4 resulted in sensitisation to the K antigen.

IT in laboratory IBCT-SRNM errors

Reporters stated that IT was involved in the error in 28/41 IBCT-SRNM cases including overriding of alerts, overreliance on alerts to 'stop' errors, alerts not updated, and issues around legacy data.

Learning points

- Laboratory staff must have an understanding of 'why' as well as 'how' particular patient groups require specific blood components, and the impact of not meeting these requirements
- LIMS rules and alerts must be used where possible to aid in decision making and prevent units being issued which do not meet a patient's specific requirements



Near miss cases n=167 (95 clinical, 72 laboratory)

Definition: A near miss event refers to any error which if undetected, could result in the determination of a wrong blood group or transfusion.

NM IBCT-WCT

In 2022 there were 115 NM IBCT-WCT, 81 occurred in the clinical area and 34 in the laboratory. A summary of these cases is shown in Figure 9.11.

There was a total of 19 NM ABOi transfusions in 2022 which is a large increase from to 5 NM ABOi in 2021, 6 originated in the laboratory and 13 in the clinical area. These were identified by a combination of patient involvement, staff vigilance and electronic PID.

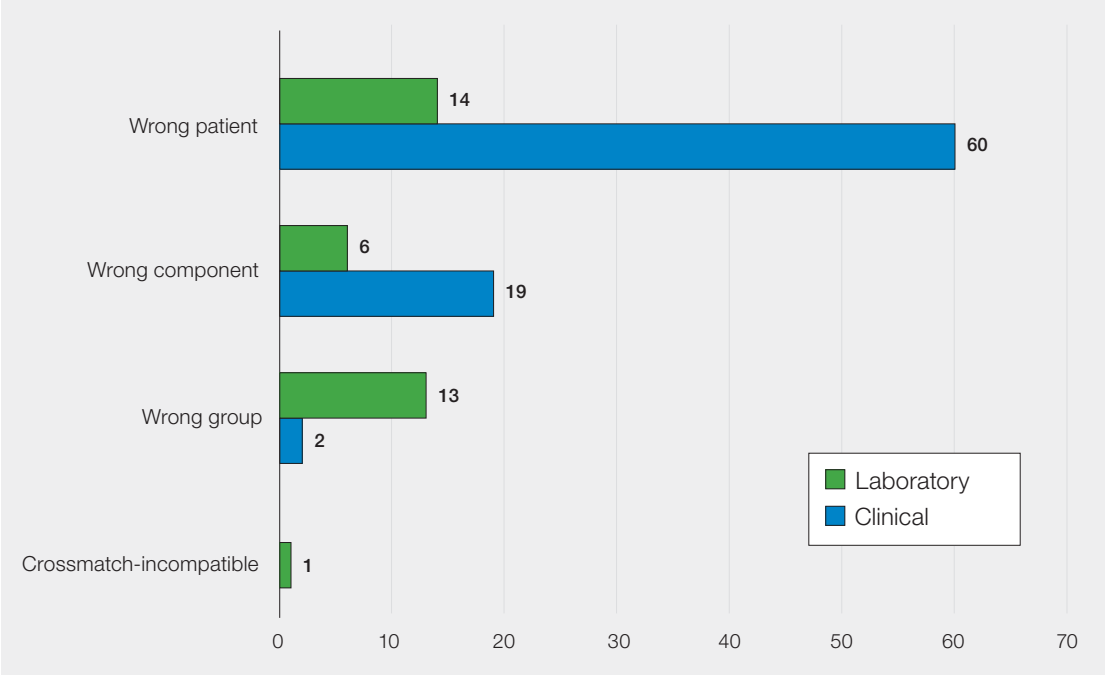


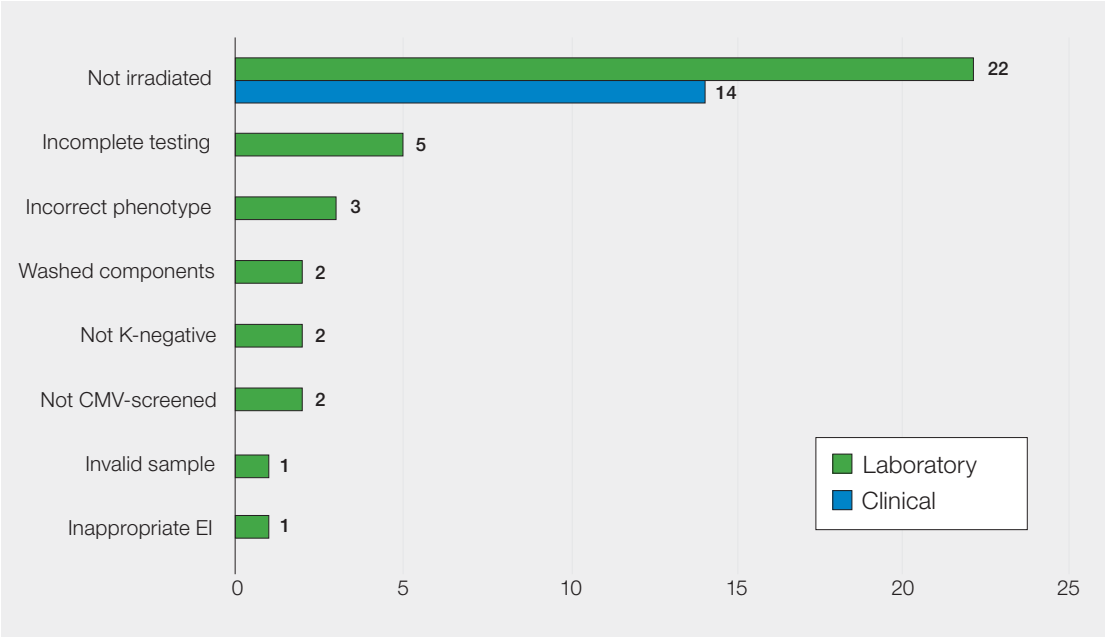
Figure 9.11: NM IBCT-WCT reported to SHOT in 2022 (n=115)

If unidentified most NM IBCT-WCT could have resulted in wrong patient transfusions, 74/115 (64.3%). Most clinical NM IBCT-WCT occurred at the collection stage, 54/81 (66.7%) and most laboratory NM IBCT-WCT occurred at the component selection stage, 12/34 (35.3%).

NM IBCT-SRNM

In 2022 there were 52 NM IBCT-WCT, 14 occurred in the clinical area and 38 in the laboratory. A summary of all NM IBCT-SRNM cases is shown in Figure 9.12.

Figure 9.12: NM IBCT-SRNM events in 2022 (n=52)



If unidentified most NM IBCT-SRNM could have resulted in patients receiving non-irradiated components, 36/52 (69.2%), all clinical NM IBCT-SRNM were in this category and were mostly due to failure to communicate the requirement to the laboratory. In 20/22 (90.1%) laboratory cases the LIMS system was involved, and flags were either not entered in a timely manner or were overridden.

Most clinical NM IBCT-SRNM occurred at the request stage, 13/14 (92.9%) and most laboratory occurred at the component selection stage, 25/38 (65.8%).

Conclusion

As with previous Annual SHOT Reports, one of the main factors leading to IBCT-WCT is the failure to positively identify the patient prior to pre-transfusion sampling or at the point of administration. Most errors occurred during routine transfusions where there is adequate time to carry out the essential safety checks. It is vital to carry out appropriate patient identification checks prior to any transfusion. Transfusion must never commence unless these checks have been completed as it is fundamental to patient safety. Omission of this critical part of the transfusion process can lead to patient harm and death.

Gaps in basic transfusion knowledge continue to contribute to errors and, in some cases, have led to major morbidity in patients. Training, competency, and skills development must be robust and of value, and not a tick box exercise, with sufficient staffing levels needed to maintain these skills. Training should be provided by sufficiently knowledgeable staff. There must be a balance between use of IT and sufficient levels of staff knowledge, reducing the overreliance of IT to 'catch' errors. Limitations within LIMS in relation to complex patient groups such as HSCT can lead to an incorrect blood group being issued or units not meeting specific requirements.

Knowledge gaps and sub-optimal training of clinical and laboratory transfusion staff have been identified to contribute to several instances of poor transfusion decision-making and errors have been seen with trained and competent staff as well (Mistry et al. 2019). It is imperative and timely to review the content, delivery, and assessment of transfusion education to all healthcare professionals. An increasing workload mismatched to staff availability has also been identified as contributory in many incidents. Staff should be supported, and laboratories and clinical areas should be sufficiently staffed to ensure workload is at a safe and acceptable level. Continual recruitment and retention issues, including staff vacancies and sickness, place a training burden on remaining staff and have a negative impact on the ability to train and maintain competency within staff groups.

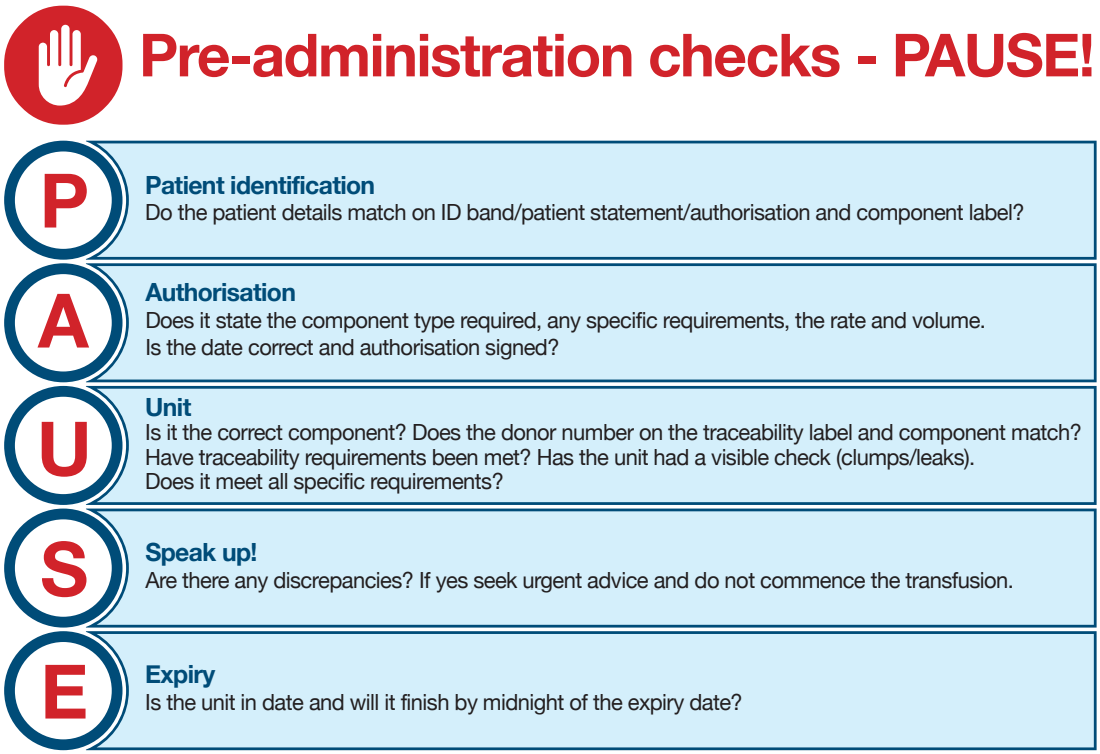
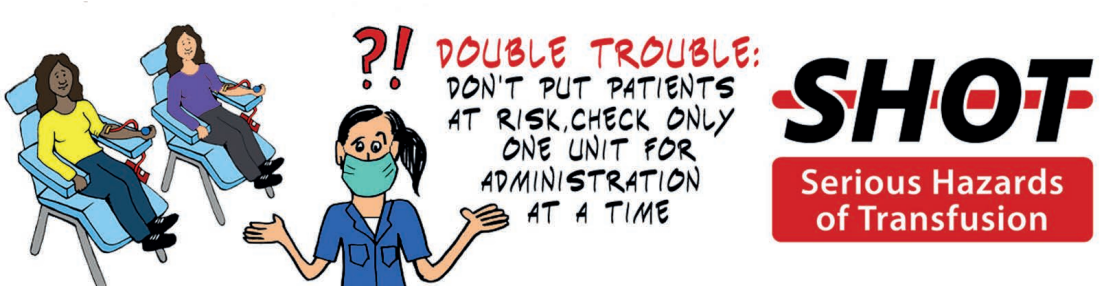


Figure 9.13: Pause and check pre-administration



Recommended resources

A just culture guide:
https://www.england.nhs.uk/wp-content/uploads/2021/02/NHS_0932_JC_Poster_A3.pdf

Use of checklists: Can Checklists Prevent Human Error?
https://www.exida.com/Blog/can-checklists-prevent-human-error

SHOT Video: ABO-incompatible transfusion events: Insights learned from SHOT Reports 2010-2019
SHOT Video: Transfusion errors in haemopoietic stem cell transplant recipients
https://www.shotuk.org/resources/current-resources/videos/

Safe Transfusion Checklist
https://www.shotuk.org/resources/current-resources/

SHOT Safety notice 02: Ensuring patient specific transfusion requirements are met
SHOT Safety notice 02: Gap analysis plan
https://www.shotuk.org/resources/current-resources/safety-notices/

SHOT Bites No. 1a and 1b: Incident investigation
SHOT Bite No. 9: Component Compatibility
SHOT Bite No. 10: Why 2 Samples?
SHOT Bite No. 12: Cognitive Bias
SHOT Bite No. 17: Learning from Near Misses (NM)
SHOT Bite No. 19: Human Factors
SHOT Bite No. 20: IBCT-SRNM
https://www.shotuk.org/resources/current-resources/shot-bites/

SHOT Webinar: Near Miss and Incident Investigation
SHOT Webinar: Laboratory and IT
SHOT Webinar: Human Factors
https://www.shotuk.org/resources/current-resources/webinars/

Patient Blood Management - Blood assist app
Apple (https://apps.apple.com/gb/app/blood-assist/id1550911130)
Google play (https://play.google.com/store/apps/details?id=uk.nhsbt.bloodassist)
Web based (https://www.bloodassist.co.uk/)

CQC Learning from Never Events
https://www.cqc.org.uk/news/stories/learning-never-events

CAS alert bedside checks
https://www.cas.mhra.gov.uk/ViewandAcknowledgment/ViewAlert.aspx?AlertID=102663

HSIB: Never events: analysis of HSIB's national investigations
https://www.hsib.org.uk/investigations-and-reports/never-events-analysis-of-hsibs-national-investigations/

UKTLC Standards 2023
https://www.shotuk.org/resources/current-resources/uktlc/

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BSH Milkins C, Berryman J, Cantwell C, et al. Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories. *Transfus Med* 2013;**23(1)**:3-35. http://onlinelibrary.wiley.com/doi/10.1111/j.1365-3148.2012.01199.x/full [accessed 27 April 2023].

BSH Robinson S, Harris A, Atkinson S, et al. The administration of blood components: a British Society for Haematology Guideline. *Transfus Med* 2018;**28(1)**:3-21. http://onlinelibrary.wiley.com/doi/10.1111/tme.12481/full [accessed 28 April 2023].

Department of Health. Safe transfusion practice: use a bedside checklist (CAS) CEM/CMO/2017/005 (2017). https://www.cas.mhra.gov.uk/ViewandAcknowledgment/ViewAlert.aspx?AlertID=102663 [accessed 24 April 2023]

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Narayan S (Ed), Poles D, et al. on behalf of the Serious Hazards of Transfusion (SHOT) Steering Group. The 2018 Annual SHOT Report (2019). https://www.shotuk.org/shot-reports/ [accessed 08 May 2022].

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