26 Transfusion Errors in Transplant Cases n=97

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Abbreviations used in this chapter

ABOi	ABO-incompatible
BMS	Biomedical scientist
BSBMTCT	British Society of Blood and Marrow Transplantation and Cellular Therapy
EBMT	European Group for Blood and Marrow Transplantation
EI	Electronic issue
HSCT	Haematopoietic stem cell transplant
IBCT	Incorrect blood component transfused
ID	Identification
IT	Information technology
LIMS	Laboratory information management system
NBTC	National Blood Transfusion Committee
NM	Near miss
PLS	Passenger lymphocyte syndrome
RCPath	The Royal College of Pathologists
SCRIPT	The SHOT United Kingdom Collaborative Reviewing and reforming IT Processes in Transfusion
SOT	Solid organ transplant
SRNM	Specific requirements not met
TA-GvHD	Transfusion-associated graft-versus-host disease
WBIT	Wrong blood in tube
WCT	Wrong component transfused

Key SHOT messages

- Flags and notes in the LIMS are not effective in preventing selection and release of ABOi components if staff do not pick these up and follow up with appropriate actions
- Communication is critical for the management of transfusion in transplant patients, particularly where there is shared care across multiple organisations
- Recommendations from the 2022 Annual SHOT Report continue to be relevant this year

Recommendations

- Processes should be in place to ensure effective communication of transplant timetables to all clinical and laboratory teams involved in patient care
- Laboratories should have a process that ensures information relating to appropriate component selection is recorded or updated in the LIMS in a timely manner, and not depend on one individual
- Laboratories should review the functionality of the LIMS with the supplier to ensure all currently available functionality is optimised for safe component selection. Where deficiencies are noted a roadmap for further development should be agreed, with timeframes, to include algorithms that support safe selection and are not dependent on flags and notes
- Where LIMS are dependent on alerts or notes for safe selection of blood components, these must be clear, unambiguous, not easily overridden and account for all component types. It should be recognised that these may not prevent ABOi events and so risk assessments must address the current situation and future plans for improvement

- Pre-transfusion checklists for transplant patients should include confirmation that components received have the correct specific requirements and ABO/D type in accordance with the transplant protocol

Action: Laboratory management, IT departments, clinical teams with responsibility for transplant patients

Introduction

For transplant recipients, decisions on which ABO/D group of components for transfusion must take account of the ABO and D types of both the recipient and the donor. Approximately 40-50% of HSCT are ABOi, this incompatibility may be major or minor. Major and minor incompatibility each occur in approximately 20-25% of transplants, and bidirectional incompatibility in 5% (Worel & Kalhs, 2008). The ABO and D group transfusion requirements of these patients change over time during the clinical course of the transplant. Bidirectional incompatibility includes both major and minor mismatch, with the presence of antibodies in both the recipient and donor plasma which can react with donor and recipient red cells respectively.

Guidance is available on the irradiation requirements for cellular component transfusion in patients at risk of developing TA-GvHD (Foukaneli, et al., 2020). The EBMT Handbook provides information on transfusion support for HSCT patients (Schrezenmeier, et al., 2019).

The 'Safe transfusions in haemopoietic stem cell transplant recipients' document has been developed by SHOT in collaboration with RCPath, NBTC and BSBMTCT. This supports safe transfusion decisions in HSCT recipients and can be incorporated into local procedures and policies.

A national guidance document for transfusions in SOT recipients is being developed by British Society for Haematology. PLS is a complication of both solid-organ and stem cell transplant, caused by donor B lymphocytes producing antibodies that can result in destruction of recipient red cells (Moosavi, et al., 2020; Yazer & Triulzi, 2007).

Summary of cases from 2023

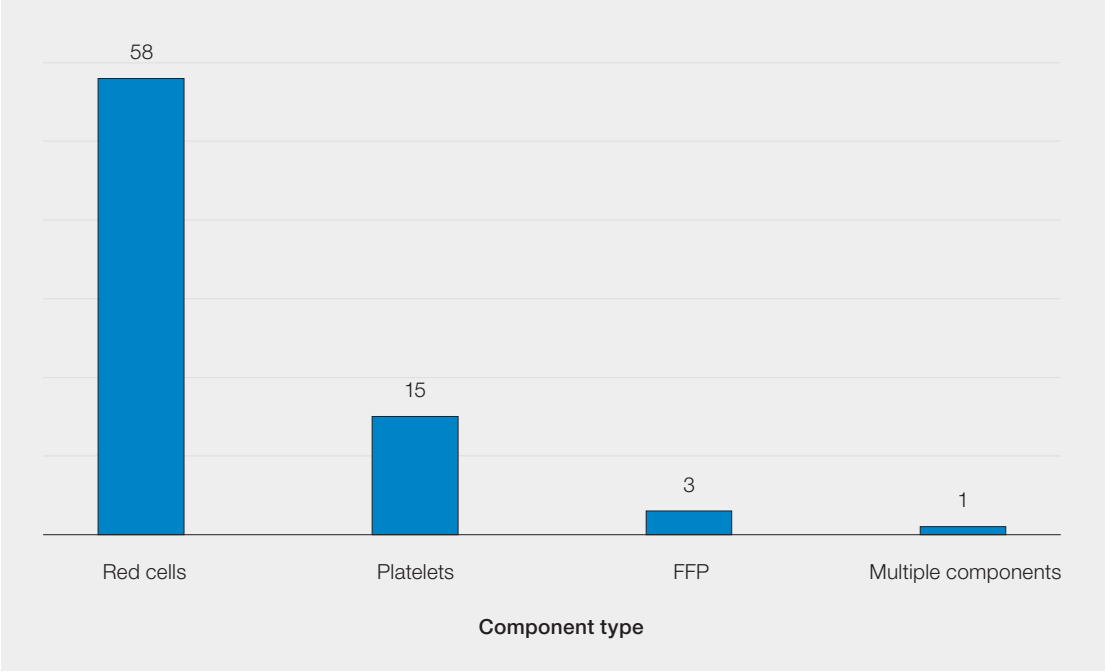
A total of 97 cases were reported to SHOT in 2023, an increase from 58 in 2022. Cases included SOT (n=19) and HSCT (n=78) recipients. Table 26.1 shows the distribution of all the cases reported. There were no deaths reported that were directly attributed to the transfusion error. Many cases, 37/97 (38.1%) were instances where the specific requirements for transfusion were not met. The majority of these (21/37) were failure to provide irradiated components, inappropriate use of electronic issue accounted for 6/37 cases. Of the 40 cases of IBCT-WCT, 37 cases involved transfusion of the wrong ABO/D group to the recipient. One case of suspected PLS was reported in a group O patient post transplant with a group A liver. In addition to the 77 transfused errors, there were 20 near miss reports.

Table 26.1: Total cases of IBCT-WCT, IBCT-SRNM and NM transfusion errors in SOT and HSCT recipients reported to SHOT in 2023 (n=97)

Type of error	IBCT-WCT and IBCT-SRNM cases	NM cases	Total cases
Wrong ABO and/or D group	37	2	**39**
Not irradiated	21	6	**27**
Wrong blood in tube	-	9	**9**
Inappropriate electronic issue	6	-	**6**
Incomplete testing	5	-	**5**
Not antigen-negative	3	-	**3**
Wrong patient	1	2	**3**
Wrong component type	2	-	**2**
Not HLA-matched	2	-	**2**
Not high-titre negative	-	1	**1**
Total	**77**	**20**	**97**

The most commonly implicated blood component in the WCT and SRNM errors reported were red cells. Figure 26.1 shows the distribution of blood components involved in these cases. In 1 case, multiple blood components were implicated.

Figure 26.1: Blood component implicated in the IBCT-WCT and IBCT-SRNM errors reported in 2023 (n=77)



FFP=fresh frozen plasma

As shown in Figure 26.2, the number of IBCT-WCT and IBCT-SRNM cases have been increasing with the highest number of incidents for both categories reported in 2023.

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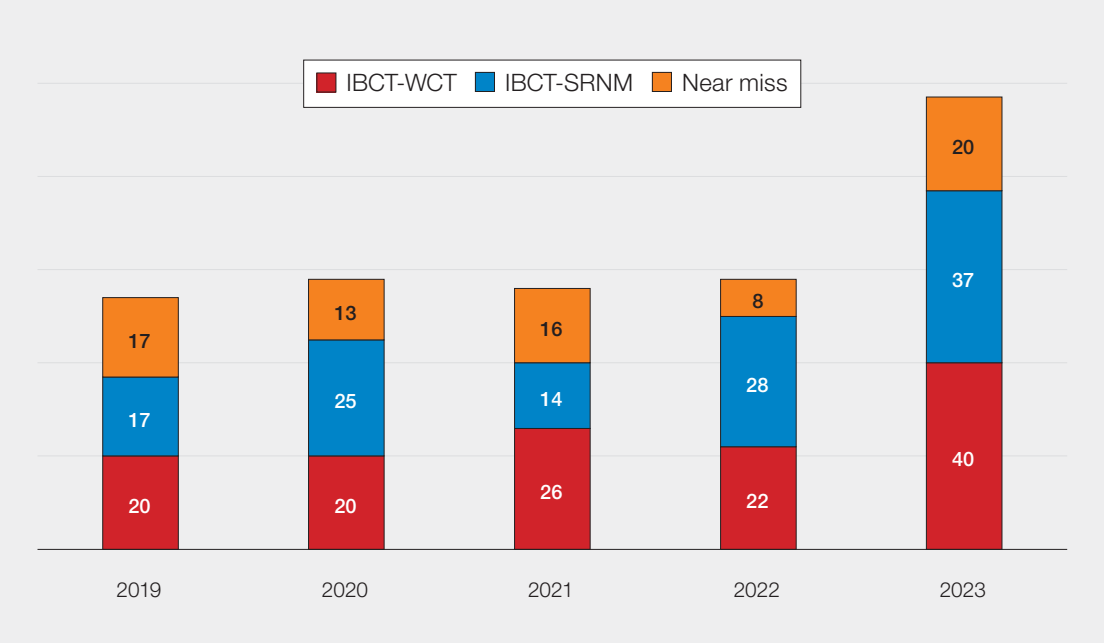

Figure 26.2: Number of transplant-related reports (HSCT and SOT) from 2019 to 2023

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

IT-related transplant cases n=72

There were 72/97 (74.2%) cases that had an IT element involved in the error. These themes are demonstrated in Figure 26.3.

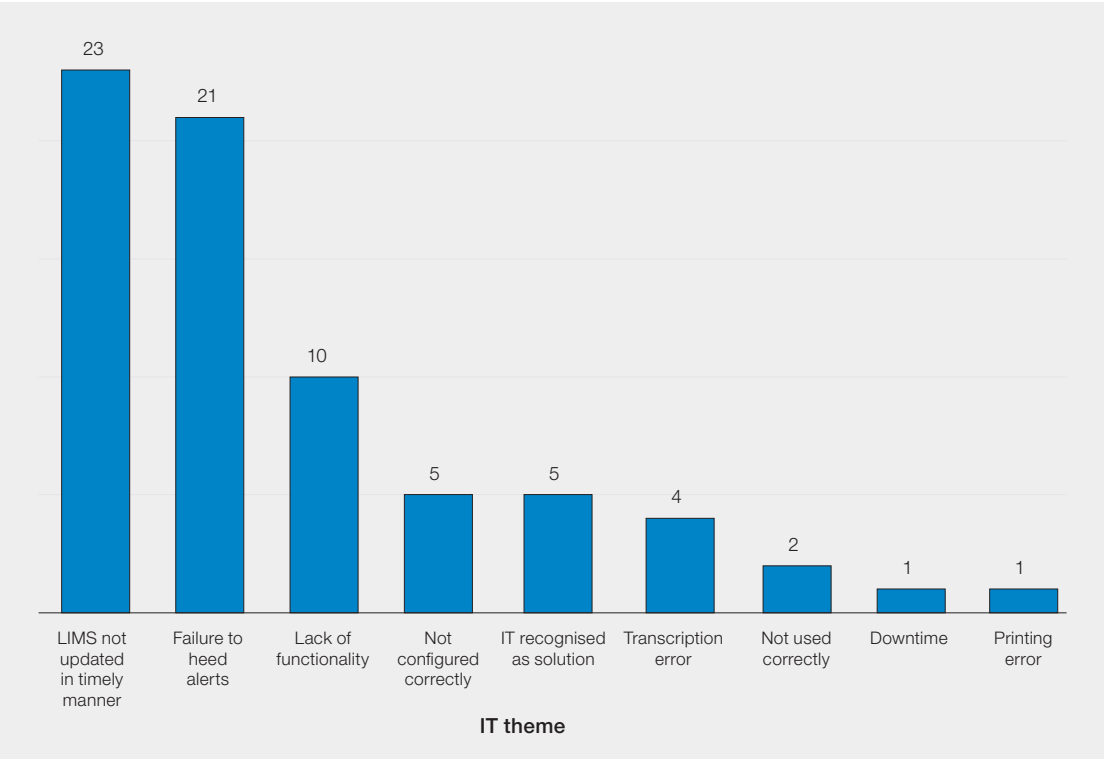

Figure 26.3: Themes related to IT in transplant error cases reported in 2023 (n=72)

IT=information technology; LIMS=laboratory information management system

Case 26.1: ABO-incompatible red cell transfusion

A HSCT patient (patient group A and donor group O) was transfused group A red cells. The information related to appropriate selection of ABO group for blood components was available in the notes in the LIMS but was not read by the BMS.

Reliance on notes and alerts in the LIMS that can be missed or easily overridden do not provide effective IT barriers to preventing error.

Case 26.2: Specific transfusion requirements not met: information not added to LIMS in timely manner

A notification of irradiated blood components requirement for a patient pre HSCT was sent to the laboratory manager by email. The patient was admitted to the ward and required a transfusion before the laboratory manager had acknowledged the email and updated the LIMS. The patient was transfused with red cells that were not irradiated.

Processes for notification of transplant information relating to appropriate selection of blood components should not be reliant on a single point of failure. In this case, notifications were sent to an individual rather than a team email, hence dependent on a single individual being able to act in a timely manner.

Case 26.3: Incorrect red cells selected for patient with suspected passenger lymphocyte syndrome

A group A patient received a liver transplant from a group O donor. Post transplant, the patient was noted to have a positive direct antiglobulin test, and group A red cells were noted to be incompatible in serological crossmatch. A sample was referred for further testing and anti-A1 eluted from the patient red cells. A requirement for group O red cells was added to the LIMS for future transfusion. However, two units of group A red cells were transfused to the patient at a later date. The units were serologically crossmatch-compatible and there was no evidence of haemolysis in the patient.

PLS is an uncommon condition. This case illustrates the importance of effective flags and algorithms in the LIMS to support safe selection of appropriate red cells. In this case, a serological crossmatch was performed, however, SHOT data continue to demonstrate that inappropriate EI occurs with this patient cohort.

Near miss errors n=20

In 2023, 11 near miss cases related to IBCT-SRNM (7/11) and IBCT-WCT (4/11) were reported, and 9 cases related to NM-WBIT. In all but 1 of the IBCT-WCT and IBCT-SRNM cases the error was detected at the pre-administration check. A formal pre-transfusion checklist was used in only 5/11 cases. In a single case, the laboratory team became aware of the transplant only when the clinical team called to discuss specific transfusion requirements.

Of the NM-WBIT cases, 6/9 were due to failure to identify the patient correctly at the time of phlebotomy, 2 due to failures to label the sample at the patient side and 1 sample was not labelled by the person taking the sample. Samples were handwritten in 8/9 cases. In 1 case the sample was labelled using an electronic system, investigation showed that the wrong ID band had been printed for the patient and positive patient identification was not performed at the time of phlebotomy.

In 2 NM-WBIT cases the reporting organisation stated that the laboratory did not employ the confirmatory sample policy (Milkins, et al., 2013). In the remaining cases 5/7 stated that the error was detected as a result of the confirmatory sample policy.

Commentary

Most transfusion-related errors in HSCT and SOT patients are either transfusion of ABO/D-mismatched blood components, or failure to administer irradiated components putting the patient at risk of TA-GvHD. Poor communication of vital information between teams involved in patient care (clinical and laboratory) resulting in failure to update the LIMS and failure to heed alerts in IT systems continue to be the most common errors noted. Users are often dependent on alerts or notes in the LIMS to make decisions about component selection rather than functionality in the LIMS that confirms the correct selection. A SHOT SCRIPT LIMS user survey in 2019 noted deficiencies in compatibility algorithms for post-transplant patients. This was explored in a LIMS supplier survey in 2020 (see 'Recommended resources' section) where these were noted as improvements in future releases by some suppliers. Where LIMS are dependent on alerts or notes for guidance on safe selection, these must be clear, unambiguous and take into account appropriate selection for red cells, plasma and platelet components. Alerts should prompt appropriate actions and not be easily overridden by the user. LIMS functionality in terms of assigning blood groups to patients where testing results are indeterminate has also been implicated in flawed decision-making.

Errors in clinical communication are further compounded by the shared care of patients between transplant centres and the patient's local hospital, which necessitates the need for effective transfer of information between multiple centres and laboratories. Where notifications are made by email, laboratories should ensure that these are accessed regularly, accessible to a team, not an individual and are not a single point of failure. Notification processes should include fail-safes, including laboratory feedback to the clinical team that the information has been added to the LIMS, incorporation of specific requirements (irradiated) into component orders and inclusion of expected component ABO types and specific requirements in pre-administration checklists.

SHOT data show that transfusion of the wrong ABO or D group in ABO- or D-mismatched transplants, and failure to provide irradiated components continues to be a problem. Although improved functionality in LIMS could reduce risk of error, this does not negate the need for staff knowledge and skills. Training, educational activities and competency-assessments should include transfusion in transplant patients, for both clinical and laboratory staff. Decision-making aids, such as the SHOT resource (Safe transfusions in haemopoietic stem cell transplant recipients; see 'Recommended resources' below) should be easily accessible and incorporated into local procedures and guidance. The impact of human factors and ergonomics on provision of safe transfusions must not be underestimated. The key to eradicating transfusion errors and advancing patient safety is to create systems for reliable healthcare delivery and systems should be designed with human factors and ergonomics at the forefront (Narayan, et al., 2023).

Recommended resources

Safe transfusions in haemopoietic stem cell transplant recipients - 2021
https://www.shotuk.org/resources/current-resources/

SHOT Bite No. 18: Transplant Patients (2021)
SHOT Bite No. 20: IBCT-SRNM (2022)
SHOT Bite No. 27: Solid Organ Transplant (SOT) 2023
https://www.shotuk.org/resources/current-resources/shot-bites/

SCRIPT survey reports
https://www.shotuk.org/resources/current-resources/script/

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